

Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, D.C. 20554

In the Matter of:)	
)	
)	
Commission Staff Requests That Interested)	WT Docket No. 07-293
Parties Supplement the Record on Draft)	IB Docket No. 95-91
Interference Rules For Wireless)	GEN Docket No. 90-357
Communications Service and Satellite Digital)	RM No. 8610
Audio Radio Service.)	
)	

COMMENTS OF SIRIUS XM RADIO INC.

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TABLE OF CONTENTS

	<u>Page</u>
I. SUMMARY	1
II. BACKGROUND	5
III. COMMENTS ON THE PROPOSED WCS RULES.....	11
A. The Proposed Rules Will Result in Deploying Devices That Will Cause Harmful Interference to Millions of Satellite Radio Consumers.....	12
1. The unprecedented 55 dB relaxation in out-of-band emission protection will create interference to satellite radio consumers.....	12
2. The proposed duty cycle limits are ineffective.....	14
3. The proposed power levels and automatic power controls offer little practical protection.....	17
4. The proposed guard band is insufficient in both size and applicability to protect satellite radio consumers from interference.....	18
B. The Proposed Rules Contain No Effective Processes to Address Interference Caused to Satellite Radio Consumers, Either Before or After Deployment.....	20
1. The proposed rules ignore the problems associated with identifying, avoiding, and remediating mobile-to-mobile interference.....	20
2. The proposed rules will not prevent interference from WCS base stations.....	21
3. The proposed rules are inconsistent among similarly situated licensees....	22
C. The Proposed Rules Do Not Reflect Real World Usage and Are Not Supported by Test Data.....	23
D. The Proposed Rules Contain Last-Minute Changes That Ignore Interference to Satellite Radio In Favor of WCS Licensees' Business Plans.	27
E. The Proposed WCS Rules Are Not "Fair and Balanced".....	29
F. Recommended Changes to the Proposed WCS Rules.....	30
1. Duty Cycle and Repetition Rate	30
2. WCS C and D Block Mobile Power Limits.....	31
3. Ground-Based Emissions Limits	32

4.	Coordination and Post-Licensing Interference Mitigation Processes	32
5.	Fixed CPE Devices	34
6.	Spectrum Aggregation	35
IV.	COMMENTS ON THE PROPOSED SATELLITE RADIO TERRESTRIAL REPEATER RULES	36
A.	The Commission Should Clarify That Sirius XM Has A Reasonable Time to Gain Certification For Its Existing Repeaters.....	37
B.	The Proposed Rules Requiring Modification of Existing Repeaters Are Overbroad...	38
C.	The Proposed Changes to the Programming Origination Language Are Unnecessary and Unclear.	41
V.	LEGAL INFIRMITIES PREVENT THE COMMISSION FROM ADOPTING THE PROPOSED RULES.	42
A.	Adopting the Proposed Rules Would Be Arbitrary and Capricious.	43
1.	The Proposed Rules Are Based on an Improper Evaluation of WCS Licensees’ Business Plans Rather Than Interference.	43
2.	The Proposed Rules Represent a Dramatic Departure from Longstanding and Successful Commission Policy, Which the Agency Said Was “Required” to Prevent Interference.....	44
3.	No Record Evidence Justifies the Proposed Rules.	46
4.	The Proposed Rules Arbitrarily Treat Similarly Affected Services Differently.....	47
5.	The Commission Must Consider — and Address — the Less Restrictive Alternatives Proposed by Sirius XM.	49
B.	The Proposed Rules, if Adopted, Would Unlawfully Modify Sirius XM’s Licenses. .	49
C.	Adopting the Proposed Rules May Violate Sirius XM’s Statutory, Constitutional, and Contractual Rights.	52
1.	The Proposed Rules May Effectuate an Impermissible Retroactive Change to Satellite Radio Licenses.....	52
2.	Adopting the Proposed Rules May Breach Sirius XM’s Existing Contractual Relationship with the FCC for Satellite Radio Licenses.....	54
3.	The Proposed Rules May Result in a Fifth Amendment Taking.	56

D. The Proposed Rules Allowing Mobile Services in the WCS Band Would Require a Reauction of That Spectrum.	57
VI. CONCLUSION.....	59
Technical Appendix	Exhibit A
The Proposed WCS Rules are Not "Fair and Balanced"	Exhibit B

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Sirius XM Radio Inc. (“Sirius XM”) hereby responds to the request from the Office of Engineering and Technology, the International Bureau and the Wireless Telecommunications Bureau to comment on draft rules in the above-captioned proceedings that are intended to resolve the thirteen-year-old proceeding to establish satellite radio repeater rules as well as the three-year-old proceeding to transform the WCS allocation into a mobile use band.¹

I. SUMMARY

The proposed rules fail to protect satellite radio’s nearly 19 million subscribers and 35 million listeners² from harmful interference. While the Staff Public Notice claims the draft rules

¹ *Commission Staff Requests that Interested Parties Supplement the Record on Draft Interference Rules for Wireless Communications Service and Satellite Digital Audio Radio Service*, Public Notice, WT Docket No. 07-293, IB Docket No. 95-91, GEN Docket No. 90-357, RM No. 8610 (rel. Apr. 2, 2010) (“Staff Public Notice”).

² Sirius XM Radio Inc., Annual Report (Form 10-K) (Feb. 25, 2010) (announcing 18,772,758 subscribers); Press Release, Sirius XM, *Arbitron Study of Satellite Radio Shows More Than 35 Million “Premium” Listeners* (Jan. 14, 2010), <http://www.prnewswire.com/news-releases/arbitron-study-of-satellite-radio-shows-more-than-35-million-premium-listeners-81475652.html>.

offer a “fair and balanced” resolution of admittedly difficult interference issues,³ the rules are obviously and overwhelmingly animated not by the FCC’s traditional function of avoiding interference but by a rush to identify as much spectrum as possible that can be described as available for mobile broadband applications and by a desire to enable particular WCS business plans.

If the Commission adopts the staff proposal, it will allow WCS spectrum to be used in a manner that will cause increased interference to satellite radio consumers, and in that eventuality, the agency should be prepared for years of interference complaints and attempted after-the-fact interference resolution. Under the proposed rules, use cases will be authorized that will mute satellite radio service — that is, entirely preventing satellite radio reception at intermittent times and random places. The Commission’s technical staff knows this.⁴ The WCS parties recognize this potential interference.⁵ While the proposed guard band will help prevent overload interference from mobile WCS devices to satellite radio receivers, it will not prevent overload interference from base and fixed WCS stations, including fixed customer premises equipment.

³ Staff Public Notice at 2.

⁴ Commission engineers acknowledged that under a proposal they verbally conveyed to the parties on March 2, 2010 — which provided somewhat greater protection to satellite radio than the rules in the Staff Public Notice — satellite radio consumers would experience harmful interference under some allowed WCS use cases. Letter from Robert L. Pettit, Counsel for Sirius XM, to Marlene H. Dortch, Secretary, Federal Communications Commission, WT Docket No. 07-293 at 2 (filed Mar. 4, 2010) (“Sirius XM Mar. 4, 2010 Ex Parte”).

⁵ WCS interests have acknowledged for years that mobile operations would increase interference to satellite radio services. *See* Letter from Jennifer M. McCarthy, Vice President, Regulatory Affairs, NextWave Wireless Inc., to Marlene H. Dortch, Secretary, FCC, WT Docket No. 07-293, IB Docket No. 95-91 at 2-3 (filed November 17, 2008) (“NextWave Wireless Nov. 17, 2008 Ex Parte”) (acknowledging that power level limitations would protect Sirius XM from interference); Comments of the WCS Coalition, WT Docket No. 07-293, IB Docket No. 95-91, GEN Docket No. 90-357, RM No. 8610 at 4 (filed Feb. 14, 2008) (“WCS Coalition Comments”) (“... rules can be crafted that minimize the inevitable interference between WCS and SDARS . . .”).

As confirmed in multiple technical submissions in this proceeding, WCS mobile operations outside of the proposed guard band, coupled with the generous limits on WCS out-of-band emissions (“OOBE”), will result in WCS devices muting satellite radio signals even when separated by significant distances. The proposed duty cycle limitations and the requirement for automatic power control are virtually meaningless and will be ineffective to prevent this interference.

The proposed rules put forth by the FCC staff are all the more unfortunate because the Commission — and the American public — can easily have it both ways. The FCC could develop rules that would both protect satellite radio listeners and enable mobile broadband use in the WCS band. Sirius XM has demonstrated technologically feasible and cost-effective solutions that will better protect adjacent band services such as satellite radio and aeronautical telemetry. In addition, the WCS licensees could deploy broadband services that are compatible with the existing allocation and service rules as well as Sirius XM’s adjacent band network. As stated by the National Broadband Plan, the Commission “cannot focus solely on “last mile” mobile connectivity, but also needs to address other potential network bottlenecks that inhibit speed, including backhaul and other point-to-point applications.”⁶ But, the recent record of this proceeding shows that WCS licensees reject such proposals because they would require additional product and network development and, therefore, do not fit their business plans.⁷ As a

⁶ Federal Communications Commission, CONNECTING AMERICA: THE NATIONAL BROADBAND PLAN at 78 (Mar. 16, 2010) *available at* <http://www.broadband.gov/plan/> (“NBP”).

⁷ In fact, the primary WCS proponent is looking to maximize the value of the WCS spectrum in order to sell it, not to develop the spectrum and serve the public. *See, e.g.* W. David Gardner, “NextWave Puts Wireless Spectrum Up For Sale,” *InformationWeek*, <http://www.informationweek.com/news/mobility/business/showArticle.jhtml?articleID=207401940> (Apr. 24, 2008); Jeff Orr, *NextWave Wireless Explores Sale of U.S. Spectrum Holdings*, <http://www.wimax.com/commentary/blog/blog-2008/nextwave-wireless-explores-sale-of-u-s-spectrum-holdings> (Apr. 25, 2008). *See also* NextWave Wireless Inc., Annual Report (Form 10-

result, the proposed revisions to the WCS service rules are unprecedented and completely abrogate the rules that the Commission adopted in 1997 specifically to prevent interference to satellite radio.

The proposed rules are also remarkable for the absence of any effective program or process to mitigate, halt, or remedy interference that will be caused to satellite radio users. Rather, satellite radio listeners (unlike other adjacent services affected by mobile WCS operations), are left with the cold comfort of a staff-issued public notice that tells them “if WCS operations cause harmful interference to [satellite radio], WCS licensees have an obligation to correct such harmful interference.”⁸ The Staff Public Notice provides no details as to how the Commission will define interference, how the FCC will identify interference or the steps the Commission will take to ensure that the WCS licensees comply with these obligations in an expeditious manner — all of which are critical for this directive to have any practical value.

Sirius XM understands the FCC’s apparent imperative to identify additional spectrum for mobile broadband use. But first, the Commission should do no harm.⁹ Even the National Broadband Plan recognized that the Commission should revise WCS technical rules only “while

K), at Part I, Item 1 (Apr. 1, 2010) (“Our domestic spectrum resides in the 2.3 GHz WCS 2.5 GHz BRS/EBS and 1.7/2.1 GHz AWS bands and offers propagation and other characteristics suitable to support high-capacity, mobile broadband services . . . [w]e continue to pursue the sale of our wireless spectrum holdings and any sale or transfer of the ownership of our wireless spectrum holdings is subject to regulatory approval. We expect that we will be required to successfully monetize most of our wireless spectrum assets in order to retire our debt.”).

⁸ Staff Public Notice at 2.

⁹ See Commissioner Robert M. McDowell, FCC, Statement Before the Committee on Energy and Commerce Subcommittee on Communications, Technology and the Internet, at 2 (Mar. 25, 2010) (“As Congress and the Commission consider the ideas from the Office of Broadband Initiative, we should make sure that we first and foremost do no harm.”), available at http://hraunfoss.fcc.gov/edocs_public/attachmatch/DOC-297139A1.pdf.

protecting federal, non-federal AMT and satellite radio operations” in the neighboring bands.¹⁰

It simply works no public good and advances no public policy to authorize service in one band that will degrade service in another, especially where the degraded service is enjoyed by nearly 35 million consumers.

Furthermore, the proposed WCS rules are legally infirm. It is unlikely the proposed rules could survive “arbitrary and capricious” review under the Administrative Procedure Act (“APA”).¹¹ In particular, the proposed rules represent a dramatic and unexplained departure from rules the FCC adopted in 1997 as “necessary” and “required” to prevent interference to satellite radio. The Commission proposes to accomplish this dramatic reversal of policy by casting aside its central mission of preventing interference to satellite radio consumers based on a record lacking adequate technical evidence to justify the proposed rules. Not only would the proposed rules violate fundamental principles of administrative law, but adopting these proposals would also violate Section 316 of the Communications Act because they improperly modify Sirius XM’s licenses without the individual hearing procedures provided by the Act. Because of these and other legal infirmities, the Commission should reject the proposal to modify the WCS rules.

II. BACKGROUND

When the Commission first allocated spectrum for WCS in 1997, it adopted strict out-of-band emission limits in order to “protect prospective [satellite radio] licensees from interference

¹⁰ See NBP at 85.

¹¹ 5 U.S.C. § 706(2)(A).

from WCS operations.”¹² The limits were specifically intended to render “mobile operations in the WCS spectrum technologically infeasible.”¹³ The FCC found that these restrictions were “necessary to ensure the viability” of satellite radio.¹⁴

It is not at all surprising that the agency would have adopted these restrictions. Adjacent mobile terrestrial and satellite services, like WCS and satellite radio, are highly incompatible, and throughout its history, the Commission has consistently recognized that incompatible neighboring systems must be protected.¹⁵ In particular, satellite services — broadcasting from thousands of miles in space and reliant on relatively weak ground signals — remain highly susceptible to interference from terrestrial base stations, mobile transceivers, and customer premises equipment operating at relatively high power levels perhaps just a few feet away from satellite radio receivers.¹⁶

¹² *Amendment of the Commission’s Rules to Establish Part 27, the Wireless Communications Service*, Report and Order, 12 FCC Rcd 10785, 10787 ¶ 3 10798 ¶ 25, 10800 ¶ 35, 10854-5 ¶¶ 136-8 (1997) (“WCS Order”); *see also Amendment of the Commission’s Rules to Establish Part 27, the Wireless Communications Service*, Memorandum Opinion and Order, 12 FCC Rcd 3977, 3979 ¶ 5 (1997) (“WCS MO&O”).

¹³ *WCS Order* at 10833 ¶ 89.

¹⁴ *WCS MO&O* at 3991 ¶ 25.

¹⁵ *See e.g.*, Spectrum Policy Task Force Report, ET Docket No. 02-135, November, 2002 at 22 (“One of the challenges presented by permitting additional flexibility within assigned spectrum is the potential for incompatible adjacent systems. For instance, low-power systems or devices with a high sensitivity to interference could be grouped with similar systems, and systems or devices with high power could be placed elsewhere. System or device spectrum incompatibility can require additional constraints in the form of guard bands, consuming valuable spectrum, or expensive filtering systems to avoid adjacent band interference. The Task Force believes that the Commission should consider making spectrum policy decisions encouraging like systems or devices to be grouped in spectrum ‘neighborhoods’ with like systems.”).

¹⁶ Sirius XM’s existing repeater network — built to overcome predictable signal path loss from terrain, buildings and other obstacles — will not and cannot protect the service from interference from mobile devices that necessarily will occur at random and unpredictable times. *See* Letter from Terrence R. Smith, Corporate Vice President and Chief Engineering Officer, and

Technically, satellite network design is an extreme example of a “noise limited” network and is similar to the two-way land mobile networks operated by public safety licensees that attempt to cover wide service areas from each base transmitter.¹⁷ As the FCC recognized in the 800 MHz public safety interference proceeding, noise limited networks must be separated from “interference limited” networks, such as the Sprint Nextel 800 MHz band network and the proposed WCS mobile broadband networks. The “near/far” geometry of the interference scenarios is well known to the Commission, and unless it imposes standards to prevent interference, service to the noise limited systems will be degraded.

Relying on the technical protections the Commission adopted in 1997, Sirius XM spent more than \$180 million at auction to acquire the satellite radio spectrum, invested billions more on infrastructure, satellites, equipment and programming, and built a highly popular consumer service. Automobile manufacturers also spent heavily to introduce satellite radio, and customers likewise spent billions of dollars on consumer equipment (including cars with built-in consumer equipment), all based on the Commission’s 1997 technical protections. Like other satellite broadcast services, Sirius XM’s network is designed to provide its subscribers with a service that is reliable and available for well over 99 percent of the time.¹⁸

James S. Blitz, Vice President, Regulatory Counsel, Sirius XM, to Marlene H. Dortch, Secretary, FCC, WT Docket No. 07-293, IB Docket No. 95-91 (filed Dec. 11, 2008).

¹⁷ See Comments of Wolfhard J. Vogel, WT Docket No. 07-293 (filed Apr. 21, 2010).

¹⁸ Sirius XM’s design goal is to provide a total service availability of 99.7 percent. In the overwhelming majority of locations throughout the country that lack foliage or other obstructions, *i.e.*, 95 percent of all road surfaces, that availability is actually 100%. A reduction of this metric and the overall quality of service will have a direct impact on our customers. Sirius XM continues to examine the impact of interference from WCS transmissions on the availability of satellite radio service and plans to provide further data to the Commission on this and related technical issues in the coming days.

The basic physics and operating characteristics of these largely incompatible services have not changed since 1997. The rules under construction in this docket may directly affect only the WCS and satellite radio industries, but their impact is far broader than two FCC services with only a handful of licensees. That is why the changes proposed by WCS licensees have been overwhelmingly opposed by car manufacturers and consumers¹⁹ — and why key members of Congress have asked the Commission to assure them that changes in the WCS rules will result in no increased interference to satellite radio consumers.²⁰ The truncated set of “interested parties” that the staff identified in the Staff Public Notice badly understates the real significance and broad impact of this proceeding.²¹

¹⁹ See, e.g. Letter from Edward A. Pleet, Ford Motor Company, to Marlene H. Dortch, Federal Communications Commission, WT Docket No. 07-293, IB Docket No. 95-91, GN Docket No. 09-47, 09-51, 09-137 (filed Jan. 26, 2010); Letter from Gregory A. Ross and Joanne M. Finnorn, General Motors North American Operations, to Marlene H. Dortch, Federal Communications Commission, IB Docket No. 95-91, WT Docket No. 07-293, GN Docket No. 09-47, 09-51, 09-137 (filed Jan. 20, 2010); Letter from Richard M. Lee and Joanne M. Finnorn, General Motors North American Operations, to Marlene H. Dortch, Federal Communications Commission, IB Docket No. 95-91, WT Docket No. 07-293 (filed Nov. 21, 2008); Comments of Mercedes Benz USA, IB Docket No. 95-91, WT Docket No. 07-293, GN Docket Nos. 09-47, 09-51, 09-137 (filed Apr. 19, 2010); Comments of National Automobile Dealers Association, WT Docket No. 07-293, IB Docket No. 95-91, GEN Docket No. 90-357, RM No. 8610 (filed Apr. 16, 2010); Comments of Association of International Automobile Manufacturers, IB Docket No. 95-91, WT Docket No. 07-293, GN Docket Nos. 09-47, 09-51, 09-137 (filed Mar. 1, 2010); Comments of Alliance of Automobile Manufacturers, IB Docket No. 95-91, WT Docket No. 07-293, GN Docket Nos. 09-47, 09-51, 09-137 (filed Mar. 3, 2010). Hundreds of consumers supporting Sirius XM have also filed comments in this proceeding. See, e.g. Comment of Scott McGee (filed Apr. 10, 2010); Comment of Travis Solladay (filed Apr. 11, 2010).

²⁰ See, e.g. *Hearing on Oversight of the Federal Communications Commission: The National Broadband Plan*, House of Representatives, Subcommittee on Communications, Technology, and the Internet, Committee on Energy and Commerce at line 3813-3836 (Mar.25, 2010) (Rep. Dingell questioning Chairman Genachowski on interference from WCS services and expressing his concern for satellite radio service) *available at* http://energycommerce.house.gov/index.php?option=com_content&view=article&id=1942:oversight-of-the-federal-communications-commission-the-national-broadband-plan&catid=134:subcommittee-on-communications-technology-and-the-internet&Itemid=74.

²¹ Staff Public Notice at 1.

What has changed since 1997 is the perceived need for hundreds of Megahertz in additional broadband spectrum, particularly mobile broadband spectrum. Clearly, this was not lost on incumbent WCS licensees, who paid the taxpayers only \$13 million for their spectrum in 1997²² and have largely warehoused it since that time. For thirteen years, most WCS spectrum has remained fallow, but for limited construction of fixed sites. Rather than providing service to the public, the WCS licensees have declined to construct in their band in the manner the Commission initially contemplated, opting instead to extend their construction commitments until they could find a more productive and profitable use of the spectrum.²³ Having rebranded their spectrum as a location for mobile broadband, the WCS licensees now stand to benefit financially.

The proposed rules are at least the second iteration this year of staff proposals for how to revise the WCS rules to allow mobile devices in this spectrum. On March 2, 2010, Commission engineering staff met with representatives from Sirius XM and WCS licensees to detail rules expected to resolve this proceeding (“March 2 Proposal”).²⁴ At that meeting, Commission engineering staff outlined a set of proposals that included a 2.5 MHz guard band, reduced out-of-band emissions limits for WCS mobile devices, and a stepped duty cycle requirement that would

²² See *WCS Auction Closes, Winning Bidders in the Auction of 128 Wireless Communications Service License*, Public Notice, 12 FCC Rcd 21653 (1997).

²³ See *Consolidated Request of the WCS Coalition for Limited Waiver of Construction Deadline for 132 WCS Licensees*, WT Docket No. 06-102, Order, 21 FCC Rcd 14134 (2006); ULS File No. 0003855241 (filed June 1, 2009), attached Request for Extension of Deadline for Establishing Compliance With Section 27.14 Substantial Service Requirement at 1 (“NW Spectrum Co. understands that other WCS licensees, including CELLUTEC., WaveTel NC License Corporation, and NTELOS, Inc. are filing similar requests at this time.”).

²⁴ See Letter from Michael A. Lewis, Engineering Consultant, Wiley Rein LLP, Counsel for Sirius XM to Marlene H. Dortch, Secretary, FCC, WT Docket No. 07-293, IB Docket No. 95-91 (filed Mar. 3, 2010) (“Sirius XM Mar. 3, 2010 Ex Parte”) (on file with author).

place greater restrictions on WCS mobile devices in the blocks closest to satellite radio operations than on those devices operating in blocks that are further removed. In response to the March 2 Proposal, Sirius XM suggested that the Commission adopt clear coordination and interference mitigation procedures to protect its subscribers.²⁵ The WCS Coalition and one WCS equipment manufacturer responded with filings complaining that the proposed protections would require them to develop equipment for use in the band rather than allow them to use commercially available equipment.²⁶ The Commission staff now appears to have modified the March 2 Proposal based on these business preferences — without regard to the impact on satellite radio consumers. None of the changes proposed by Sirius XM — and critical to preventing interference to satellite radio reception — made it into the Staff Public Notice or the proposed rules.

Sirius XM has no interest in stunting the development of mobile broadband in general or the use of WCS spectrum in particular.²⁷ Its sole interest in the WCS proceeding is to protect

²⁵ Letter from Terrence R. Smith, Corporate Vice President and Chief Engineering Officer, and James S. Blitz, Vice President, Regulatory Counsel, Sirius XM, to Julius P. Knapp, Chief, Office of Engineering and Technology, FCC, WT Docket No. 07-293, IB Docket No. 95-91 (filed Mar. 17, 2010) (“Sirius XM Mar. 17, 2010 Mitigation Ex Parte”).

²⁶ See Letter from Paul J. Sinderbrand, Counsel to the WCS Coalition, to Marlene H. Dortch, Federal Communications Commission, WT Docket No. 07-293, IB Docket No. 95-91 (filed Mar. 15, 2010) (“WCS Coalition Mar. 15, 2010 Ex Parte”); Letter from Dana Nehama, Alvarion Inc., to Julius P. Knapp, Chief, Office of Engineering and Technology, Federal Communications Commission, WT Docket No. 07-293 (filed Mar. 15, 2010) (“Alvarion Mar. 15, 2010 Ex Parte”). The WCS Coalition also provided a third party analysis confirming that the March 2 proposal would prevent licensees from aggregating spectrum because the system operator would have to conform to the lowest duty cycle assigned to any of the channels. Letter from Paul J. Sinderbrand, Counsel to the WCS Coalition, to Julius Knapp, Chief, Office of Engineering and Technology, Ruth Milkman, Chief, Wireless Telecommunications Bureau, Mindel De La Torre, Chief, International Bureau, Federal Communications Commission, Docket No. 07-293, at 2 (filed Mar. 31, 2010) (“WCS Coalition Mar. 31, 2010 Ex Parte”).

²⁷ The WCS Coalition appears to have developed last-minute theory that Sirius XM’s opposition to the WCS proposals is attributable to concern that WCS licensees will offer consumers access to streaming Internet radio programming. See Letter from Paul J. Sinderbrand,

millions of existing satellite radio listeners. In Sirius XM's view, the Commission could both protect satellite radio consumers and make 20 MHz of spectrum available for mobile broadband — with the right technical standards. This cannot be done, however, under the proposed rules.

III. COMMENTS ON THE PROPOSED WCS RULES

The WCS Coalition has been dismissive of any concern about interference to satellite radio — an indifference now captured by the proposed rules. No interference will occur, Sirius XM has been told, because WCS mobile devices will transmit infrequently and, in almost all instances, at power levels well below the FCC's maximum permitted values. In fact, the WCS interests claim that “the Sun, the moon and the stars must align for interference to occur.”²⁸

Obviously, that is not what the FCC thought in 1997. And it is not consistent with the record of this proceeding. In fact, record test data have repeatedly demonstrated a significant threat of interference to satellite radio consumers and have confirmed the need for stringent requirements on WCS services to protect adjacent band services. And real-world evidence exists that WCS mobile networks will not operate as benignly as the WCS Coalition has claimed throughout this proceeding. Yet, the proposed rules are bereft of effective processes for quickly and efficiently resolving interference that does occur, even where WCS operations are in technical compliance with the Commission's rules.

Counsel to the WCS Coalition, to Marlene H. Dortch, Secretary, FCC, WT Docket No. 07-293, IB Docket No. 95-91 at 1 (filed Apr. 7, 2010) (“WCS Apr. 7, 2010 Ex Parte”) (“And, adoption of new rules will subject Sirius XM to new competition from WCS-enabled mobile broadband...”). This, of course, is preposterous. Consumers are already able to access such services from existing mobile broadband networks that have much greater capacity and wider coverage today than any WCS licensee is likely to have for the foreseeable future. The impact of adding new WCS services to that dynamic is insignificant.

²⁸ See, e.g., Letter from Paul J. Sinderbrand, Counsel to the WCS Coalition, to Marlene H. Dortch, Secretary, Federal Communications Commission, WT Docket No. 07-293, IB Docket No. 95-91 at Attachment Slide 12 (filed Dec. 10, 2009) (“WCS Coalition 2009 Proposal”).

A. The Proposed Rules Will Result in Deploying Devices That Will Cause Harmful Interference to Millions of Satellite Radio Consumers.

Despite the staff's assertion that the proposed rules "include numerous provisions to minimize the risk of harmful interference to [satellite radio] from mobile WCS operations," the record indicates that these purported protections are inadequate to protect satellite radio listeners. The Staff Public Notice cites to four specific rules in support of its claim: (1) OOB limits reduced to a "level less than that of nearly any other mobile devices"; (2) a 38 percent cap on duty cycle of WCS transmitters; (3) a 13 dB peak-to-average power ratio; and (4) a 2.5 MHz guard band on each side of the satellite radio allocation where no mobile WCS devices would be permitted.²⁹ The staff's apparent reliance on these provisions disregards the reality reflected in the Commission's 1997 restrictions on WCS service and ignores reams of technical submissions filed in this proceeding.

1. The unprecedented 55 dB relaxation in out-of-band emission protection will create interference to satellite radio consumers.

Emissions from transmitting devices are not confined to the user's authorized bandwidth. The energy that falls outside of the authorized bandwidth is referred to as out-of-band emissions. OOB is a source of interference to receivers operating on adjacent channels. Moreover, affected receivers cannot filter the undesired OOB because doing so would also disrupt the desired transmission. Therefore, OOB must be controlled at the transmitter.

In 1997, as part of its initial order adopting service rules for the WCS band, the FCC required OOB from WCS transmitters into the satellite radio allocation to be attenuated by a factor of $110 + 10 \log (P)$ dB less than power of the main carrier.³⁰ These were the levels

²⁹ Staff Public Notice at 1, 2.

³⁰ *WCS Order* at 10854 ¶ 136.

deemed “required” and “necessary” to protect satellite radio users.³¹ But under the proposed rules, this protection value will drop to as little as $55 + 10 \log(P)$ dB. This 55 dB reduction represents an astonishing relaxation in OOB protection of more than 300,000 times.

The Staff Public Notice trumpets the proposed limits as “less than that of nearly any other mobile devices.”³² It is irrelevant whether this is true; what matters is whether the proposed limits are sufficient to protect the adjacent satellite radio services. Few, if any, of the non-WCS mobile services are immediately adjacent to a satellite downlink allocation — a technical reality that requires greater interference protection.³³ This point is not in dispute by either the WCS licensees or the FCC staff. These dramatically reduced OOB protection limits now proposed by the staff have been tested and shown to cause harmful interference to satellite radio reception. While Sirius XM acknowledges that the effects of overload interference are dominant, introduction of OOB will exacerbate the impact.³⁴

³¹ *Id.* at 10787 ¶ 3.

³² Staff Public Notice at 2.

³³ Sirius XM cannot identify any similar allocation where mobile devices are asked to protect mobile satellite receivers on adjacent frequencies, except when the licensees are interrelated or coordinated.

³⁴ *See*, Letter from Terrence R. Smith, Corporate Vice President and Chief Engineering Officer, and James S. Blitz, Vice President, Regulatory Counsel, Sirius XM Radio Inc. to Marlene H. Dortch, Secretary, Federal Communications Commission, WT Docket No. 07-293 (filed Feb. 27, 2009) (“Sirius XM Feb. 27, 2010 Ex Parte”) (describing a laboratory testing of Sirius XM receiver sensitivity to interference from the WCS band).

2. The proposed duty cycle limits are ineffective.

Duty cycle measures the ratio of time spent transmitting to total time elapsed for a mobile device. Essentially, it expresses what percent of time within a given period of time a device is actually transmitting. Effective duty cycles are critical to avoid interference in adjacent bands.³⁵

The proposed 38% duty cycle restrictions offer no real protection to satellite radio services. During the 2009 technical demonstrations in Ashburn, Virginia,³⁶ Sirius XM showed that even with a 25% duty cycle (and operating with $56 + 10 \log (P)$ OOB attenuation) — a scenario providing even greater protection to satellite radio than under the proposed rules — WCS mobile devices would mute satellite radios at distances of over 25 meters.³⁷ Worse yet, the rules propose no duty cycle at all for fixed CPE — an omission which is glaring in light of the potentially greater interference risk posed by the higher power transmissions of these devices.

The critical impact of duty cycle was borne out in the Ashburn Demonstrations. It is also confirmed in the attached Technical Appendix which shows that the interfering signal from a WCS handset operating at 12.5% duty cycle can operate with 5 dB more power without causing

³⁵ Even WCS licensees Horizon, Wi-Com and NextWave stressed the importance of duty cycle in a joint filing as early as November 2008, when they acknowledged that their potential to cause interference was reduced by the low power and limited amount of time in which their mobile devices would actually be transmitting. NextWave Wireless Nov. 17, 2008 Ex Parte at 1-3.

³⁶ In August 2009, engineers from Sirius XM, the WCS Coalition, the FCC and the aeronautical telemetry community performed a series of demonstrations and tests on consecutive days in an attempt to show the scope and nature of potential interference to satellite radio reception from WCS devices (“the Ashburn Demonstrations”). These demonstrations are further described *infra* at III.C.

³⁷ Letter from Terrence R. Smith, Corporate Vice President and Chief Engineering Officer, and James S. Blitz, Vice President, Regulatory Counsel for Sirius XM, to Marlene H. Dortch, Secretary, FCC, WT Docket No. 07-293, IB Docket No. 95-91, at 16-17 (filed Aug. 3, 2009) (“Sirius XM Ashburn Ex Parte”).

muting to satellite radio reception as compared to the same device operating on the same WCS frequencies at 31% duty cycle.³⁸

Equally troubling is the ambiguity of the proposed duty cycle limitations. By not specifying a time frame within which the 38% duty cycle must be observed, the proposed rules have no practical limiting effect. For example, Sirius XM has previously suggested that the duty cycle restrictions be defined with respect to a five millisecond time period. Without such a specification, duty cycle is effectively meaningless, since restricting mobile transmissions to 38% of an unspecified time limit is no restriction at all. WCS licensees cannot simultaneously claim that transmissions will be rare *and* that they require a much higher duty cycle to support their applications and business models.³⁹

Further, the duty cycle in the proposed rules does not vary based on spectral distance from the satellite radio band. Under the March 2 Proposal, the duty cycle would become less restrictive as the WCS spectrum block in question was further spectrally removed from satellite radio operations. Thus, mobile transmission in the WCS C and D blocks (those parts of the WCS spectrum having the highest interference potential) would have been restricted to a 12.5% duty cycle, while mobile transmissions in the lower A and upper B blocks (which are further

³⁸ See Technical Appendix at 5 attached hereto as Exhibit A (“Technical Appendix”) (comparing test cases 3 and 5 in Table 1).

³⁹ The impact of this open-ended cycle is also demonstrated in the Technical Appendix. Technical Appendix at 5 (comparing test cases 1 and 2 of Table 1). This data shows that requiring WCS transmissions to occupy every other frame of the WiMAX transmission will significantly reduce interference potential. Based on its statements made after the Ashburn tests, the WCS Coalition agrees that transmissions should not occupy each successive transmit frame. See Letter from Mary N. O’Connor, Counsel to the WCS Coalition, to Marlene H. Dortch, Secretary, Federal Communications Commission, Exhibit B at 1 (filed Aug. 4, 2009) (“WCS Coalition Aug. 4, 2009 Ex Parte”) (asserting that actual mobile activity on a WCS system should consist of 5 ms of transmission followed by at least 5 ms of reception plus guard time).

removed from satellite radio operations and thus less likely to interfere) would have been subject to a 35% duty cycle.

The WCS Coalition complained that this structure would prevent the aggregation of multiple blocks because a system operator would have to abide by the most restrictive duty cycle.⁴⁰ But by proposing a uniform duty cycle, the proposed rules now encourage spectrum aggregation — even though interference from aggregations of spectrum larger than 5 MHz has not been tested in this proceeding. It is worth noting that Sirius XM’s initial tests show that 10 MHz wide transmissions have greater interference potential than 5 MHz wide transmissions.⁴¹

Finally, the Staff Public Notice offers no explanation for the duty cycle distinction between Time Division Duplex (“TDD”) and Frequency Division Duplex (“FDD”) devices; nor is any explanation apparent on the face of the proposed rules. This lack of an explanation is perhaps due to the fact that the record contains no testing or analysis that would support applying different duty cycle limits to different transmission technologies. In any event, such technology-determined duty cycles — such as those proposed here — are inconsistent with the Commission’s longstanding policy favoring technology neutrality.⁴²

⁴⁰ See WCS Coalition Mar. 31, 2010 Ex Parte at 2.

⁴¹ See Technical Appendix at 6 (comparing test cases 12 and 13 in Table 2).

⁴² See, e.g., *Federal-State Joint Board on Universal Service*, Report and Order, CC Docket No. 96-45, 12 FCC Rcd 8776, 8802 ¶ 49 (2007) (listing technological neutrality as a principle of competitive neutrality); Federal Communications Commission Strategic Plan for Fiscal Years 2009-2010 (June 25, 2008) (stating “Regulatory policies must promote technological neutrality...” as one of the FCC’s strategic goals.). See also Letter from Michael A. Lewis, Engineering Consultant, Wiley Rein LLP, Counsel for Sirius XM Radio Inc. to Marlene H. Dortch, Secretary, Federal Communications Commission, WT Docket No. 07-293, IB Docket No. 95-91, at 3 (filed April 5, 2010) (“Sirius XM Apr. 5, 2010 Ex Parte”) (stating Chief Knapp assured Sirius XM that “the draft final rules would be technologically neutral.”).

3. The proposed power levels and automatic power controls offer little practical protection.

The proposed power levels and automatic power control requirements are inadequate to protect satellite radio from harmful interference. Sirius XM appreciates that the proposed rules require automatic transmit power control (TPC) mechanisms to ensure that mobile devices operate “with the minimum power necessary for successful communications.”⁴³ However, without additional detail and specific benchmarks, this purported protection is illusory.

There is little doubt that WCS mobile devices operating at maximum power will interfere with satellite radio receivers when the two devices are in close proximity. Sirius XM has submitted much test data demonstrating this to be the case.⁴⁴ WCS licensees have implicitly accepted this fact but stated that Sirius XM’s concerns are exaggerated because WCS mobile devices will rarely operate at maximum power.⁴⁵

As Sirius XM previously explained, a generalized automatic transmitter power control requirement does not ensure minimum power usage in a wireless system.⁴⁶ Wireless network operators must enable maximum transmitter power when the mobile device is operating at the fringe of base station coverage. During the initial stages of network deployment, operators must maximize the coverage area of each base station meaning that the probability of a mobile device operating in fringe reception area is high. This fact was borne out in observations and

⁴³ Staff Public Notice at 10, § 27.50(a)(3)(iii) (hereinafter “Proposed Rule”).

⁴⁴ See, e.g., Comments of Sirius Satellite Radio Inc., WT Docket No. 07-293, IB Docket No. 95-91, GEN Docket No. 90-357, RM No. 8610, at Exhibit C (filed Feb. 14, 2008) (“Sirius Comments”).

⁴⁵ NextWave Wireless Nov. 17, 2008 Ex Parte at 3.

⁴⁶ See Letter from James S. Blitz, Sirius XM Radio Inc. to Marlene H. Dortch, Secretary, Federal Communications Commission, IB Docket No. 95-91, WT Docket No. 07-293, Exhibit A at 13-14 (filed Sept. 8, 2008).

measurements conducted by Sirius XM of the Clear network in Philadelphia.⁴⁷ There, Sirius XM found that its subscriber device operated at maximum power (*i.e.*, 250 mW) far more often than the comments of WCS licensees would have us expect.⁴⁸ Without a specific definition of what constitutes “the minimum power necessary for successful communications” or more clarity on a definition of interference or unacceptable signal levels, this TPC requirement will fail to serve its intended purpose — limiting WCS power to prevent interference to satellite radio.⁴⁹

4. The proposed guard band is insufficient in both size and applicability to protect satellite radio consumers from interference.

Sirius XM agrees with the staff that a guard band between the satellite radio allocation and WCS devices is necessary to minimize the impact of overload interference to satellite receivers. Sirius XM has submitted extensive test data proving that emissions from mobile devices operating in the WCS C and D blocks (immediately adjacent to the satellite radio allocation) will mute satellite radio service even when the devices are separated by as much as 30 meters.

WCS Coalition members themselves have tacitly acknowledged that WCS mobile devices cannot operate on frequencies abutting the satellite radio allocation. During the Ashburn Demonstrations, the WCS licensees avoided highlighting the interference impact of signals

⁴⁷ See Letter from Michael A. Lewis, Engineering Consultant, Wiley Rein LLP, Counsel to Sirius XM, WT Docket No. 07-293, IB Docket No. 95-91 (filed Feb. 24, 2010) (“Sirius XM Feb. 24, 2010 Ex Parte”). See Section III.D., *infra*, for further discussion of Clear’s Philadelphia network.

⁴⁸ *Id.* at Attachment Slide 8-9

⁴⁹ See Letter from Robert L. Pettit, Counsel to Sirius XM Radio, Inc. to Marlene H. Dortch, Secretary, Federal Communications Commission, IB Docket No. 95-91, WT Docket No. 07-293, at Attachment Slide 8 (filed Jan. 22, 2010) (“Sirius XM Jan. 22, 2010 Ex Parte”) (“[TPC] can assist in reducing interference potential for WCS into Sirius XM. However, the parameters need to be clearly defined to assure that protection is provided.”).

occupying the entire WCS C and D blocks by shifting the carrier frequency to create a *de facto* 2.5 MHz guard band to Sirius XM's operations.⁵⁰ WCS licensees have also submitted proposals to the FCC proposing restricted mobile use of the 2 MHz immediately adjacent to the satellite radio allocation.⁵¹

However, there is no technical reason to limit the guard band to the proposed 2.5 MHz. Throughout this proceeding, Sirius XM has shown that WCS emissions in any portion of the C and D block will cause harmful interference.⁵²

Even if the proposed guard band were sufficient in bandwidth, the draft rules inexplicably would not apply a guard band to all WCS devices. The proposed rules would allow fixed subscriber devices, termed customer premises equipment or CPE,⁵³ to operate throughout all parts of the WCS C and D blocks, and under the proposed rules the devices could operate with up to 20 watts average power. Since such devices have no restrictions on external antennas or outdoor placement, their potential to cause interference to satellite radio is tremendous. The staff's proposal also provides no operating definition of CPE. Sirius XM has taken new measurements, provided in the attached Technical Appendix, showing the interference potential from a 2 watt WCS fixed CPE device mounted outdoors 10 feet above ground level. Sirius

⁵⁰ Letter from Paul J. Sinderbrand, Counsel to the WCS Coalition, to Marlene H. Dortch, Secretary, Federal Communications Commission, WT Docket No. 07-293, IB Docket No. 95-91 at 5-6 (filed May 18, 2009) ("Ashburn Demonstration Test Plan Ex Parte").

⁵¹ See Letter from Jennifer M. McCarthy, Vice President, Regulatory Affairs, NextWave Wireless, Inc. to Marlene Dortch, Secretary, Federal Communications Commission at 3, IB Docket No. 95-91, WT Docket No. 07-293, GN Docket No. 90-357 (filed Nov. 26, 2008); see also NextWave Wireless Nov. 17, 2008 Ex Parte at 1-2.

⁵² See, e.g., Sirius XM Jan. 22, 2010 Ex Parte at Slide 6; Sirius XM Ashburn Ex Parte.

⁵³ One example of such a device would be a fixed or portable wireless modem for desktop computers.

XM's measurements prove that such devices, permissible under the staff's proposed rules, would mute all satellite radio within 113 meters.⁵⁴

B. The Proposed Rules Contain No Effective Processes to Address Interference Caused to Satellite Radio Consumers, Either Before or After Deployment.

Sirius XM appreciates the concern the Staff Public Notice expresses about remedying interference caused to satellite radio by WCS operations. According to the Staff Public Notice:

[I]rrespective of compliance with the technical standards, if WCS operations cause harmful interference to the [satellite radio service], WCS licensees have an obligation to correct such harmful interference.⁵⁵

However, by failing to include any interference definition in the proposed rules, processes for identifying or resolving interference, or penalties for violations, the proposed rules fail to back up this tough talk with enforceable obligations.

Despite the likelihood of interference, the interference mitigation in the proposed rules is focused almost exclusively on the requirement that WCS licensees give Sirius XM ten business days' notice of base station deployment and "cooperate" on the location of base station sites. This provision — aimed solely at base stations and apparently ignoring mobile-to-mobile interference — is inadequate to prevent the deployment of interfering uses in the real world.

1. The proposed rules ignore the problems associated with identifying, avoiding, and remedying mobile-to-mobile interference.

The most intractable interference problems resulting from this proceeding will revolve around mobile-to-mobile interference. Both satellite radio listening and likely WCS applications will occur in moving cars periodically and randomly in close proximity to each other. Yet, the

⁵⁴ See Technical Appendix at 7 (test case 16 in Table 3).

⁵⁵ Staff Public Notice at 2.

proposed rules fail to recognize or address the unique interference issues that this will create. Indeed, the proposed rules provide for no coordination or information sharing prior to mobile device deployment. The proposed rules provide no opportunity for pre-deployment mitigation. And in the absence of effective interference mitigation procedures, Sirius XM consumers will face a near impossible task; even if a consumer — or Sirius XM — could identify the source of this drive-by interference as being a WCS device, the rules are devoid of any processes or procedures for addressing that interference or any penalties in the event a WCS licensee causes interference or fails to comply with the interference mitigation rules.

2. The proposed rules will not prevent interference from WCS base stations.

The proposed rules fail to establish criteria to encourage the deployment of WCS base stations in a manner that protects adjacent satellite radio service. In a 2006 white paper, Sirius XM urged the Commission to impose ground-based emissions levels on all 2.3 GHz licensees to avoid the creation of “hot spots” that would result in overload interference to adjacent band receivers.⁵⁶ Sirius XM’s study of WiMAX devices currently operating in Philadelphia showed large areas surrounding base stations where base station power was at levels that would mute satellite radio receivers.⁵⁷ Thus Sirius XM proposed policies to avoid interference from WCS base stations at the time of deployment.

Instead, the proposed rules obligate WCS licensees to do no more than select base station sites and frequencies that “minimize the possibility of harmful interference to operations in the

⁵⁶ White Paper: Interference to the SDARS Service from WCS Transmitters, attached to Letter from Carl R. Frank, Counsel to Sirius Satellite Radio Inc., to Marlene H. Dortch, Secretary, FCC, WT Docket No. 05-256 and IB Docket No. 95-91 (filed Mar. 29, 2006).

⁵⁷ Sirius XM Feb. 24, 2010 Ex Parte at Attachment Slide 9.

[satellite radio] bands” and share site location information.⁵⁸ These rules provide no meaningful opportunity for Sirius XM to work with WCS licensees to mitigate interference from base stations. The staff proposes no procedures for satellite radio licensees to request further information or propose changes to the technical parameters of “notified” base stations. Such one-sided communication, even if provided in good faith, is unlikely to “minimize” interference before it occurs.

Moreover, the proposed rules provide that WCS licensees “must cooperate in good faith in the selection and use of new station sites and new frequencies to reduce interference,”⁵⁹ but leave a host of critical questions unasked and unanswered:

- What does “cooperation” mean?
- Does it apply both inside and outside the notification period?
- What happens if the parties disagree about the interference impact of a particular site?

Until these questions are addressed, the “good faith” requirement is all but meaningless.

3. The proposed rules are inconsistent among similarly situated licensees.

The rules applicable to satellite radio stand in stark contrast to the detailed procedures applicable to Mobile Aeronautical Telemetry (“MAT”) licensees located on the other end of the WCS spectrum. The proposed rules require WCS licensees to coordinate deployment of base

⁵⁸ Specifically, sub-sections (b) and (c) of the rule would have WCS licensees provide to satellite radio licensees a written notice containing specified technical details 10 business days before commencing operation of a new base station or 5 business days before modifying an existing base station. Sub-part (e) also creates a “duty to cooperate” to remedy harmful interference.

⁵⁹ Proposed Rule § 27.72(e).

stations with MAT facilities, take all practicable steps to reduce the likelihood of harmful interference to MAT facilities, and “achieve a mutually satisfactory coordination agreement.”⁶⁰

Interference is interference, and the same interference rules should apply to all similarly impacted victims of WCS interference. Surely, satellite radio consumers are entitled to the same protections from interference as any other spectrum users. And if the proposed rules reflect a justified concern with regard to MAT services, they should reflect the same concern on the other side of the spectrum.

C. The Proposed Rules Do Not Reflect Real World Usage and Are Not Supported by Test Data.

The record of this proceeding is replete with tangible examples of likely interference to satellite radio receivers. For example, as noted above, in February 2010, Sirius XM submitted field measurements and observations from an operating 2.6 GHz WiMAX network located in Philadelphia.⁶¹ Since these measurements were based on an operating WiMAX system, they are a likely representation of the types of services and devices that WCS licensees will seek to deploy under their modified rules. Sirius XM showed that devices on the 2.6 GHz network operate at maximum power for a significant period of time. Also, the devices almost always transmit even when they are not in an active application mode. Sirius XM has measured this near constant “pinging” of the WiMAX network at maximum power levels for a significant period of time, indicating the potential for interference even when the WCS device is not in use.

⁶⁰ Proposed Rule § 27.73.

⁶¹ See Letter from Terrence R. Smith and James S. Blitz, Sirius XM Radio, Inc. to Marlene H. Dortch, Secretary, Federal Communications Commission (filed Feb. 16, 2010) (“Sirius XM Feb. 16 Ex Parte”); Sirius XM Feb. 24, 2010 Ex Parte.

Moreover, it seems increasingly obvious that mobile video will occupy WCS channels for significant periods of time and poses a much greater interference threat than low activity uplink applications such as web browsing or VOIP. Over the past several months, the staff and the WCS Coalition have discounted Sirius XM's concerns about the likelihood of mobile video uplinks originating on WCS frequencies. However, 2.6 GHz mobile devices featuring a forward-facing camera suitable for video conferencing applications are currently available on the retail market and are even being sold with suction cups and instructions for mounting on a car windshield, which will significantly enhance the device's likelihood of causing interference.⁶² Even more recently, the next generation iPhone has been disclosed and one of the prime new features of America's most popular smart-phone is apparently a forward facing camera designed to enable video chat applications.⁶³ The staff's proposed rules fail to mitigate the interference potential from such devices operating in the WCS spectrum. To the contrary, relaxation of the staff's previously stated recommendations on duty cycle promote such applications.

In addition to failing to consider real world usage, the proposed rules are not supported by tested data. Although the Staff Public Notice asserts that the proposed rules are based in part on "tests conducted in an open process,"⁶⁴ many of the proposed rules are untested while others adopt technical parameters that have been demonstrated to cause interference. Since at least

⁶² Such applications will exhibit high duty factor and demand higher transmission power to maintain video quality — factors that highly affect interference to satellite radio reception. Despite the WCS Coalition's reluctance to admit that this type of technology is forthcoming, Sirius XM has discovered widespread commercial interest in such devices on WiMAX platforms, and has even purchased a wireless device optimized for video chats with a suction cup for attachment to a car's windshield. *See* Sirius XM Feb. 24, 2010 Ex Parte at 2; Sirius XM Mar. 17, 2010 Mitigation Ex Parte at 2, A2-A3.

⁶³ *See* Jason Chen, "This Is Apple's Next iPhone," *Gizmodo*, <http://gizmodo.com/5520164/this-is-apples-next-iphone> (Apr. 19, 2010).

⁶⁴ Staff Public Notice at 1.

February 2008, Sirius XM urged the Commission to require joint testing, performed under the supervision of FCC engineers, as the best way to ensure compatible operations between WCS and the satellite radio service.⁶⁵ Sirius XM proposed developing with the WCS spectrum holders, and under the Commission's direction, reciprocal and appropriate test plans that would examine both the impact on satellite radio receivers of WCS WiMAX base stations and terminals operating as the WCS Coalition proposed, and the impact of satellite radio repeaters on WCS operations under the then-proposed rules. Sirius XM offered to share the cost of such testing by a mutually acceptable third party. Even if the two sides disagreed over the relevance of the collected data, joint testing would have at least provided a common source of information to help focus the debate and expedite a resolution to this proceeding.

This independent joint testing has never occurred. However, in the summer of 2009, WCS licensees acceded to back-to-back demonstrations conducted at a WCS-selected site in Ashburn, Virginia. There, engineers from Sirius XM and the WCS Coalition performed a series of demonstrations and tests with participation from FCC staff and the aeronautical telemetry community, in an effort to show the scope and nature of potential interference to satellite radio reception from WCS devices.⁶⁶ During the first day's demonstration, the WCS Coalition showed that a certain configuration of a single mobile WCS device can be operated under specific usage patterns in a single cell network and cause only limited interference to satellite radio reception.

The WCS Coalitions' demonstrations at Ashburn, however, do not support the proposed rules. First, the demonstration was conducted in an area of the country receiving the strongest

⁶⁵ See, e.g., Sirius Comments at 24 ("Sirius would be pleased to do joint interference testing with the WCS under FCC oversight").

⁶⁶ See Sirius XM Ashburn Ex Parte.

possible signals from Sirius XM's satellites — other areas of the country receive satellite signals as much as 6 dB weaker. In addition, the test site had few obstructions (*e.g.*, foliage, buildings, or overpasses) that typically attenuate the received satellite signal. Also, the WCS Coalition was unable to attach an external antenna to its transmitting device which made it difficult to orient the antenna in a manner that properly mimics handheld and dashboard use. Finally, only one WCS transmitter was part of the limited test network. This allowed lower power levels and burst rates than would be the case in a typical network with multiple WCS transmissions occurring simultaneously.⁶⁷ If the Staff wished to experience how a real world (multi-cell, multi-user) network behaved, commercial deployments of WiMAX networks operate nearby in the Baltimore and Philadelphia markets in the 2.6 GHz band.

Even with these favorable conditions, during one case, the prototype WCS mobile device did mute reception of the satellite radio signal in the neighboring vehicle. And in those cases where muting did not occur, the satellite radio signal reception was impaired from the WCS interference in the form of lowered signal to noise ratio and increased bit errors. In more typical conditions where the desired satellite signal strength would be lower than at the demonstration site, the WCS interference would leave the satellite radio signal with less service margin to mitigate other fading effects.

In contrast to the WCS Coalition's sole source demonstration, Sirius XM showed how a variety of mobile WCS configurations and use cases — cases that would be allowed under the WCS Coalition's proposed rules — cause devastating interference to satellite radio reception

⁶⁷ See *id.* at 3-4. Also, the WCS Coalition have never made public the complete logs and test result data from their portion of the Ashburn Demonstrations despite repeated requests that they do so. Without this information, it is impossible for the Commission or Sirius XM to fully evaluate the parameters that were tested by the Coalition.

even at extreme separation distances. In fact, the testing that Sirius XM conducted showed that transmissions originating on all WCS spectrum blocks muted satellite radios at distances of more than 25 meters, even in the presence of a terrestrial repeater signal.

At the conclusion of the Ashburn Demonstrations, Commission staff verbally acknowledged the need for any modified WCS rules to incorporate the technical parameters that the WCS interests demonstrated at Ashburn. Before leaving the field, it was agreed by all parties, including key FCC staff, that subsequent joint meetings would be needed to discuss the results and to develop common rule recommendations. Despite Sirius XM's repeated requests by Sirius XM, those meetings never occurred. Sirius XM submitted a technical proposal in early 2010 including reasonable restrictions, consistent with the results from Ashburn, that would allow mobile WCS to coexist with satellite radio.⁶⁸ The parties did not meet again until March 2, 2010 — eight months after the Ashburn tests — where the staff presented its tentative recommendations to both sides for resolving these proceedings. Those recommendations failed to adopt the specifications in Sirius XM's technical proposal.

D. The Proposed Rules Contain Last-Minute Changes That Ignore Interference to Satellite Radio In Favor of WCS Licensees' Business Plans.

For years, the Commission's apparent intention was to allow its engineering staff to resolve these WCS and satellite radio proceedings by managing interference based on technical realities. Toward this end, as the Staff Public Notice correctly acknowledges, an extensive technical record has developed.⁶⁹ And, on March 2, 2010, Commission engineering staff met

⁶⁸ Letter from Terrence R. Smith, Corporate Vice President and Chief Engineering Officer, and James S. Blitz, Vice President, Regulatory Counsel for Sirius XM, to Ronald Repasi, Deputy Chief, Office of Engineering and Technology, Federal Communications Commission (filed Jan. 5, 2010) ("Sirius XM Jan. 5, 2010 Ex Parte").

⁶⁹ Staff Public Notice at 1.

with representatives from Sirius XM and the WCS licensees to present rule proposals expected to resolve this proceeding.⁷⁰

Following this meeting, Sirius XM filed a letter suggesting revisions in order to better protect satellite radio consumers from harmful interference.⁷¹ Specifically, Sirius XM offered a framework for coordination that would (1) reduce the likelihood of interference prior to the deployment of new WCS mobile or Sirius XM terrestrial repeater facilities, and (2) establish clear mechanisms for identifying and resolving harmful interference that occurs after deployment.⁷²

The WCS Coalition and one equipment manufacturer filed separate letters complaining that the proposed rules would hamper their ability quickly and cheaply to deploy 4G mobile services using commercially available equipment.⁷³ The WCS Coalition predicted difficulties negotiating manufacturing agreements with vendors if the proposed rules made WCS mobile broadband a “one-off” service.⁷⁴

Commission engineering staff again met with Sirius XM on April 2, 2010 to discuss the possibility of a Public Notice being issued addressing the proposed rules.⁷⁵ At this meeting, the

⁷⁰ See Sirius XM March 3, 2010 Ex Parte.

⁷¹ See Sirius XM Mar. 17, 2010 Mitigation Ex Parte.

⁷² *Id.*

⁷³ See WCS Coalition Mar. 15, 2010 Ex Parte; WCS Coalition Mar. 31, 2010 Ex Parte; Alvarion Mar. 15, 2010 Ex Parte.

⁷⁴ See WCS Coalition Mar. 15, 2010 Ex Parte at 1; WCS Coalition Mar. 31, 2010 Ex Parte at 3.

⁷⁵ See Sirius XM Apr. 5, 2010 Ex Parte.

staff told Sirius XM that the rules to be proposed were fundamentally the same as the ones discussed on March 2, 2010, although slightly “tweaked.”⁷⁶

In reality, the proposed rules contain last-minute changes that simply ignore interference concerns in favor of promoting certain WCS licensees’ business models. As an obvious example, the March 2 Proposal varied the WCS duty cycle limits from 12.5% to 35% based on spectral distance from the satellite radio service. These duty cycle limits were supported by the Ashburn Demonstrations where WCS mobile transmissions with a 25% duty cycle muted satellite radio receivers.⁷⁷ The WCS Coalition’s March 31, 2010 response sought to increase these duty cycle limits noting that “it is common for commercial systems to allocate approximately 38% of each frame to uplink (“UL”) transmissions to maximize throughput.”⁷⁸ The proposed rules contain the WCS requested flat 38% duty cycle limitation, notwithstanding the demonstrated interference to satellite radio.

Conversely, Sirius XM’s coordination proposal, which was based solely on a desire to mitigate the potential of interference to both parties, was completely ignored. Sirius XM urges the Commission to harmonize the final rules with the agency’s mission to protect the existing satellite radio service from harmful interference.

E. The Proposed WCS Rules Are Not “Fair and Balanced”.

Far from being “fair and balanced,” the proposed rules overwhelmingly favor the WCS licensees to the detriment of satellite radio listeners. This inequity is obvious when the proposals of Sirius XM, the WCS Coalition, and the draft rules in the Staff Public Notice are compared on

⁷⁶ *Id.* at 1.

⁷⁷ *See* Sirius XM Ashburn Ex Parte at 16-17.

⁷⁸ *Id.*

the chart in Exhibit B. Indeed, in some cases, the FCC staff proposed rules favor the WCS licensees even when the WCS and satellite radio licensees had reached a different agreement.

F. Recommended Changes to the Proposed WCS Rules.

As discussed above, the proposed rule changes provide insufficient protection to satellite radio service and inadequate remedies for addressing and resolving interference should it occur. The Ashburn Demonstrations and Sirius XM's various submissions during the course of this proceeding show that a number of factors work together to determine whether satellite radio service will be muted by mobile WCS operations. These factors are interrelated and cannot easily be isolated. However, Sirius XM recommends, at a minimum, the following changes to the staff's proposed Part 27 rules, which would provide enhanced protection for the satellite radio service while still promoting the deployment of mobile broadband in the WCS spectrum.⁷⁹

1. Duty Cycle and Repetition Rate

The Staff Public Notice recommends a flat 38% duty cycle limit for all WCS frequencies capable of supporting mobile devices. Sirius XM urges the Commission to adopt the staff's initial recommendations in the March 2 Proposal, which varied the duty cycle limits from 12.5% to 35% depending on spectrum block. The data compiled during the Ashburn Demonstrations and the data attached hereto fully support the staff's original view that interference to satellite radio is dependent on the duty cycle of the interfering signal and distance from the satellite radio bands.

Sirius XM also recommends that the rules specify a duty cycle measurement time frame of 5 milliseconds. The staff's proposed rules provide no clarity on the measurement time frame

⁷⁹ The justification for each of these recommendations is amply demonstrated throughout these comments.

although Sirius XM and the WCS Coalition were told verbally that it would be 5 milliseconds. In addition, the rules should clarify that every other frame of the transmission should be idle. These conditions are fully consistent with the demonstration setup used by the WCS Coalition and its explanations for how mobile WiMAX devices would operate in the WCS band.⁸⁰ Moreover, duty cycle limits would be controlled by the network and would require no special design modifications for WCS mobile devices that would defeat standardization or otherwise delay deployment.

2. WCS C and D Block Mobile Power Limits

The Staff Public Notice allows mobile devices occupying frequencies in the WCS C and D block to transmit with up to 250 milliwatts. This should be reduced to a maximum of 150 milliwatts average EIRP. NextWave and Horizon previously informed the Commission that “150 mW average EIRP, along with a power density of 50 mW/MHz, should provide additional protection to Sirius XM, but still enable WCS C and D block licensees to offer a viable two-way broadband service.”⁸¹ Like duty cycle, assignment of power levels would be controlled by the

⁸⁰ At Ashburn, the WCS Coalition took issue with how Sirius XM replicated a WiMAX uplink and stated the following: “In an operating [TDD] system you have a transmission followed by guard time, followed by a reception followed by guard time and then it is repeated as necessary. In order to accurately represent the actual behavior of a two-way signal, SDARS should have modulated 5 ms followed by a 5 ms (or slightly more to accommodate guard time) off time followed by the next transmit frame. SDARS did not do this, but rather just burst the channel (or some subset of tones) 6, 12, or 25 % of the time. It appears that the Sirius XM showed nothing more than the effect of average power density, based on a duty cycle of a transient waveform. If done properly (modulated 5 ms followed by a 5 ms dead time) then the test would have been a more accurate representation of the operation of a mobile device.” WCS Coalition Aug. 4, 2009 Ex Parte Exhibit B at 1. The measurements provided in the attached Technical Appendix confirm that limiting transmissions to every other frame provides significant interference protection to satellite radio service. Sirius XM urges the Commission to codify the above explanation in the proposed rules.

⁸¹ NextWave Wireless Nov. 17, 2008 Ex Parte at 2.

network and would require no special design modifications for WCS mobile devices that would defeat standardization or otherwise delay deployment.

3. Ground-Based Emissions Limits

Sirius XM requests that the FCC set ground-level emissions limits near WCS base stations as a means of limiting the potential for harmful interference to satellite radio receivers. Furthermore, the FCC should require that the WCS network be deployed with a cell density such that a power level greater than -44 dBm would not be present for greater than 100 meters of continuous road surface on major and secondary roads.⁸² The Staff has verbally told Sirius XM that its preferred remedy to harmful interference would be to require a denser network deployment to reduce instances of overload. Therefore, the network should initially be designed to comply with this recommendation to avoid interference. Since this requirement only impacts the network design, it has no effect on the ability to deploy standard solutions for mobile devices.

4. Coordination and Post-Licensing Interference Mitigation Processes

The revised WCS rules should also require WCS and satellite radio licensees to negotiate a coordination agreement governing WCS base station deployment, defining harmful interference to satellite radio, obligating WCS licensees to resolve harmful interference if it occurs, establishing an expedited procedure for FCC adjudication in the event of disputes, and, in any event, imposing significant penalties on WCS licensees who cause interference to satellite radio.

Sirius XM urges the Commission to require satellite radio licensees and WCS licensees to enter into a written coordination agreement — just as the Commission proposes to require

⁸² Note that this standard should not affect the deployment of fixed point-to-point service or backhaul links on WCS spectrum as such systems are unlikely to place high level emissions at ground level.

between WCS and MAT licensees. A written coordination document would establish key parameters and metrics for WCS base station deployment.⁸³ One benefit of having a coordination agreement is that it ensures all rights and responsibilities are properly assigned prior to any instance of interference.⁸⁴ Taking corrective action after deployment may mean that the damage has already occurred, when it may be impossible to undo the harm that has already been caused to a company's reputation and business.⁸⁵ Moreover, in the event that a dispute did arise, the coordination agreement could expedite its resolution by providing for prompt Commission adjudication.⁸⁶

The Commission's rules should also define harmful interference to satellite radio to establish a benchmark for the impermissible degradation of mobile service availability. Sirius XM submits that the phrase "harmful interference" in the context of WCS licensee interference into the satellite radio band should mean "muting" of satellite radios. But whatever the definition, the parties and the FCC need a shared, unequivocal understanding of what constitutes "harmful interference" so they can determine whether it has occurred and/or been corrected.

The FCC must also — by rule — obligate WCS licensees to resolve harmful interference by immediately ceasing transmissions, regardless of whether the interference is being caused by base stations or mobile units. Commission staff has verbally assured Sirius XM on more than one occasion that if Sirius XM or its customers identifies interference caused by WCS licensees, the Commission will require the WCS licensee to shut down its operation of the offending

⁸³ Sirius XM Mar.17, 2010 Mitigation Ex Parte at 2, A2-A3.

⁸⁴ *Id.* at A2.

⁸⁵ *Id.* at 2.

⁸⁶ *Id.* at A2.

transmitter.⁸⁷ Articulating this responsibility in the agency's rules for WCS service is consistent with its approach in other services, and given the unique circumstances of the interference these rule modifications will create to an existing service with millions of customers, no less is needed here.⁸⁸ Sirius XM has previously advanced proposals providing for expedited complaint resolution and possible license forfeiture for parties who cause interference.⁸⁹ Including such requirements in the WCS rules would also ensure that future entities acquiring WCS licensees are fully aware of their obligations to satellite radio

5. Fixed CPE Devices

The Staff Public Notice proposes to allow fixed consumer premises devices to operate with up to 20 watts peak EIRP on all WCS frequencies including the portions of the C and D blocks where mobile subscriber devices would not be permitted. Fixed CPE that operate with 2 watts average EIRP or less are permitted to meet the same OOB limits recommended for mobile WCS devices.⁹⁰ Fixed CPE would not be subject to the transmitter power control

⁸⁷ Sirius XM Apr. 5, 2010 Ex Parte at 4 (“If Sirius XM identifies areas of interference or if customers complain about new sources of interference, Mr. Knapp said the Commission would immediately order the affected WCS licensee to shut down the offending transmitter.”). Additionally, capturing mobile to mobile interference is infeasible.

⁸⁸ Cf. 47 C.F.R. § 25.255 (providing that if harmful interference is caused to other services by MSS ATC operations, the MSS ATC operator “must resolve any interference.”); 47 C.F.R. § 73.157(b)(2) (providing that “the FCC may notify the licensee to modify or cease operation to resolve interference complaints” related to using a directional antenna).

⁸⁹ See Sirius XM Mar. 17, 2010 Mitigation Ex Parte.

⁹⁰ The OOB requirements for such fixed CPE would be not less than $(55 + 10 \cdot \log(P) \text{ dB})$ on all frequencies between 2320 and 2324 MHz and on all frequencies between 2341 and 2345 MHz, not less than $(61 + 10 \cdot \log(P) \text{ dB})$ on all frequencies between 2324 and 2328 MHz and on all frequencies between 2337 and 2341 MHz, and not less than $(67 + 10 \cdot \log(P) \text{ dB})$ on all frequencies between 2328 and 2337 MHz. Fixed CPE operating at powers greater than 2 watt average EIRP would be required to meet the proposed OOB limits applicable for other fixed WCS transmitters in satellite radio band, namely $(75 + 10 \cdot \log(P) \text{ dB})$ on all frequencies between 2320 and 2345 MHz.

requirement nor are there any proposed restrictions on the use of external antennas or outdoor installations.

At a minimum, Sirius XM recommends that the OOB limits for fixed CPE devices should be maintained at the existing $80 + 10 \log P$ on all frequencies between 2320-2345 MHz. The WCS interests have submitted no data or analysis into the record that warrant this modification of the OOB limits for fixed devices. Nor has any data or analysis been submitted on the path losses associated with WCS transmitting devices located within a home or apartment as opposed to a vehicular environment that would justify distinguishing fixed devices from mobile devices. The FCC should therefore extend the applicability of its proposed guard band by prohibiting the operation of fixed CPE in the 2.5 MHz immediately adjacent to satellite radio.

6. Spectrum Aggregation

Over the past two and a half years, all technical analysis filed in this proceeding has focused on the interference potential associated with WCS transmissions that occupy a single 5 MHz channel bandwidth. The staff's recommendations enable WCS spectrum aggregation to support 10 MHz or even 12.5 MHz mobile transmissions. In the Technical Appendix attached to this pleading, Sirius XM provides data showing a greater interference potential from wider bandwidth signals, most likely caused principally by intermodulation products originating from the 10 MHz multi-carrier WCS signal. Until data is provided that disproves this analysis, the WCS rules should establish a maximum occupied bandwidth of 5 MHz, which is consistent with every technical submission filed by WCS licensees to support their recommended rule changes.

IV. COMMENTS ON THE PROPOSED SATELLITE RADIO TERRESTRIAL REPEATER RULES

Since the inception of satellite radio, the Commission recognized the need for terrestrial repeaters to fill satellite signal coverage gaps.⁹¹ Consumers require terrestrial repeaters of sufficient power and flexibility to serve this intended purpose across a wide range of environmental scenarios.⁹² Furthermore, there is no verifiable evidence that terrestrial repeaters pose any significant risk of harmful interference to WCS mobile operations. Nevertheless, Sirius XM has long supported reasonable technical limits and licensing rules for terrestrial repeaters because of the certainty such rules would bring to satellite radio operations.

On balance, the draft Part 25 rules meet satellite radio's terrestrial repeater needs.⁹³ Specifically, the proposed 12 kW average EIRP and 13 dB peak to average power ratio limits are generally acceptable for most situations. Sirius XM also appreciates blanket licensing for its repeaters,⁹⁴ which it has advocated for years,⁹⁵ and welcomes the flexible site-by-site licensing

⁹¹ *Establishment of Rules and Policies for the Digital Audio Radio Service in the 2310-2360 MHz Band*, Report and Order, Memorandum Opinion and Order, and Further Notice of Proposed Rulemaking, 12 FCC Rcd 5754, 5810-12 (1997); *see also XM Radio Inc., Application for Special Temporary Authority to Operate Satellite Digital Audio Radio Service Complementary Terrestrial Repeaters*, Order and Authorization, 16 FCC Rcd 16781, 16783, ¶ 7 (2001) ("XM 2001 STA") ("In 1997 when the Commission adopted service rules for [satellite radio] and requested further comment on complementary terrestrial repeaters, it was clearly contemplated that the repeaters were to be part of the proposed satellite systems.").

⁹² *See, e.g.*, Sirius Comments at 7-8.

⁹³ Sirius XM assumes that special temporary authorization (STA) of terrestrial repeaters will remain available. There will doubtless be some period of time between the effective date of terrestrial repeater rules and the issuance of a blanket license during which Sirius XM will need to maintain, renew and seek additional STA for its terrestrial repeaters.

⁹⁴ *See* Proposed 47 C.F.R. § 25.144(e).

⁹⁵ *See, e.g.*, Sirius Comments at 9-11.

for terrestrial repeaters requiring special analysis under NEPA or that, because of environmental or other factors, may be allowed to operate outside of the 12 kW average EIRP limit.⁹⁶

The proposed terrestrial repeater rules would nonetheless benefit from some minor modification or clarification. Specifically, Sirius XM is concerned with the certification requirement for existing terrestrial repeaters, implementation of the new power level and OOB rules, and revisions to the pre-existing prohibition of local programming origination.

A. The Commission Should Clarify That Sirius XM Has A Reasonable Time to Gain Certification For Its Existing Repeaters.

Sirius XM has long supported the notion that terrestrial repeaters approved and constructed pursuant to a blanket license should go through the Commission's equipment authorization process.⁹⁷ Furthermore, Sirius XM fully accepts its responsibility to ensure that its equipment operates in compliance with the Commission's rules. However the fact that Sirius XM's repeaters have operated for years without causing interference to adjacent band users, as well as the novelty of requiring certification for equipment that has been operating for nearly a decade and that cannot be licensed to any entity other than Sirius XM, suggests that Sirius XM be allowed sufficient time and an expedited process in which to obtain equipment authorization.

At this time, there is no efficient procedure in place for handling this sort of equipment certification. Pursuant to STA, Sirius XM operates hundreds of satellite radio terrestrial repeaters across the United States of various models and ages. As currently drafted, the proposed rules would appear to require that Sirius XM's terrestrial repeaters be certified as of the date of rules' adoption. However, due to the lack of an established procedure, and the number

⁹⁶ See Proposed 47 C.F.R. § 25.144(e)(9).

⁹⁷ Sirius Comments at 10.

and complexity of these certification requests, this process will demand significant time and resources. Accordingly, the Commission should establish at least a twenty-four month window for Sirius XM to complete certification of all existing terrestrial repeaters. Sirius XM does not oppose the setting of interim benchmarks — which may include conducting internal testing and maintaining documentation showing full compliance — to ensure progress toward meeting this obligation. Moreover, the Commission should allow Sirius XM to use a procedure other than certification to authorize terrestrial repeaters of makes and models that are currently in operation. In this circumstance, a simplified authorization process such as Verification or Declaration of Conformity seems more appropriate than Certification.⁹⁸

B. The Proposed Rules Requiring Modification of Existing Repeaters Are Overbroad.

The proposed rules would require Sirius XM to reduce the power or revise the OOB of certain terrestrial repeaters within 180 days of being notified that a “potentially affected” WCS licensee intends to commence commercial services within the following 365 days.⁹⁹ A “potentially affected” WCS licensee is defined to include any C or D block licensee authorized to operate a base station in the same Regional Economic Area Grouping (REAG) as a satellite radio terrestrial repeater.¹⁰⁰

REAGs are extraordinarily large service areas. Only six cover the entire continental United States. Under this proposed rule, a WCS licensee planning to commence service in San

⁹⁸ See 47 C.F.R. §§ 2.902, 2.906. In the broadcast context, AM, FM, and TV transmitters are subject to verification, and only LPFM must be certified, and transmitters in use prior to 1955 may continue to be used if they continue to comply with technical requirements. See 47 C.F.R. § 73.1660.

⁹⁹ See Proposed 47 C.F.R. § 25.214(d).

¹⁰⁰ *Id.*

Diego, California could require Sirius XM to modify the operation of a terrestrial repeater outside Seattle, Washington, well over 1,000 miles away and separated by mountains, forests, and several major cities. Reliance on REAGs would require Sirius XM to undergo costly and potentially disruptive modifications of its service in circumstances where it is clear that no interference will possibly occur.

Furthermore, the WCS licensee providing this notice may never ultimately begin operating or may not commence service in the time indicated.¹⁰¹ Indeed, nothing in the proposed rule would deter WCS licensees from notifying Sirius XM the day after issuance of the order enacting these rules that they intend to deploy nationwide and that Sirius XM must modify all of its existing higher power terrestrial repeaters within 180 days.

In order to prevent costly and unnecessary repeater modifications,¹⁰² the Commission should modify the proposed rule in two ways. First, it should significantly restrict the geographic area in which a WCS licensee can force Sirius XM to make a network modification. A proximity-based — as opposed to broad market area-based — approach would be consistent with rules the FCC has adopted in various other proceedings where coordination distances are rooted in actual concerns for interference, including as recently at last month in the *SkyTerra ATC Modification Order*.¹⁰³ Although Sirius XM's terrestrial repeaters have not been shown to

¹⁰¹ The WCS licensees were first issued over a decade ago, and yet despite years of highly vocal promotion, no significant WCS deployments have ever occurred.

¹⁰² The simultaneous, unnecessary modification of hundreds of repeaters nationwide would be especially burdensome for Sirius XM which, as a service primarily relying on satellite delivery, has limited ground-based resources to deploy to effect these modifications. Moreover, because each such modification will also reduce satellite radio service from that repeater, a frivolous request also has the public interest implication of requiring Sirius XM to cut back service to its customers.

¹⁰³ See *SkyTerra Subsidiary LLC, Request for Modification Authority for an Ancillary Terrestrial Component*, Order and Authorization, DA 10-534, ¶ 43 (rel. Mar. 26, 2010)

pose any interference threat to WCS operations, out of an abundance of caution, Sirius XM proposes a notification distance of 5 km between a satellite radio terrestrial repeater and a planned WCS base station.

Second, the Commission should not allow a WCS licensee to trigger modification of satellite radio operations without a good faith demonstration of the WCS licensee's intention to construct a network in that market. When faced with a similar risk of gamesmanship and spectrum warehousing in another context, the Commission adopted a requirement for space station applicants to post a "performance bond" to demonstrate a good faith intent to proceed.¹⁰⁴ A similar performance bond requirement would be an appropriate mechanism to ensure that a WCS licensee actually intends to construct a functioning network prior to exercising its option to trigger modification of existing satellite radio repeaters. Alternatively, the Commission could require some other affirmative showing of a WCS licensee's good faith intention to build a network, coupled with a monetary sanction if a WCS licensee provided this notice without a reasonable expectation that it would construct within its promised time frame.

(modifying 47 C.F.R. § 25.253(f), which sets coordination distance between L-Band MSS ATC transmitters and SARSAT earth stations based on actual risk of interference); *see also Wireless Operations in the 3650-3700 MHz Band*, Report and Order and Memorandum Opinion and Order, 20 FCC Rcd 6502, 6524 ¶ 60 (2005) (creating 150 km exclusion zone to protect grandfathered C-Band FSS earth stations from newly licensed terrestrial uses); 47 C.F.R. § 24.237 (determining coordination distances for 2 GHz PCS and fixed microwave operations based upon antenna height and transmitter power).

¹⁰⁴ See *Amendment of the Commission's Space Station Licensing Rules and Policies*, First Report and Order and Further Notice of Proposed Rulemaking, and First Report and Order, 18 FCC Rcd 10760, 10824-25 ¶¶ 166-67 (2003).

C. **The Proposed Changes to the Programming Origination Language Are Unnecessary and Unclear.**

Proposed Section 25.144(e)(4) includes an unnecessary and confusing change to the STA condition prohibiting local origination of programming at terrestrial repeaters. The condition the Commission has imposed for years on Sirius XM's terrestrial repeater STAs provides:

terrestrial repeaters are restricted to the simultaneous retransmission of the complete programming, and only that programming, transmitted by the satellite directly to [satellite radio] subscribers' receivers.¹⁰⁵

The Commission's proposed rule retains this sentence but also adds a clause to this condition saying that Sirius XM's terrestrial repeaters:

may not be used to distribute any information not also transmitted to all subscribers' receivers.¹⁰⁶

The new language does not appear to add any additional protection or restriction related to original purpose of this condition. The goal of the original restriction was to prevent Sirius XM from using its terrestrial repeaters to originate localized content in order to compete with broadcasters on a local basis.¹⁰⁷ As written in the current STAs, the condition accomplishes this goal by effectively requiring that Sirius XM offer only one programming stream nationwide, which is available to all satellite receivers.¹⁰⁸ Thus the proposed new clause is unnecessary.

¹⁰⁵ See Sirius XM Radio Inc., File No. SAT-STA-20100211-00025 (stamp grant 03/31/10).

¹⁰⁶ See Staff Public Notice, Proposed Rule § 25.144(e)(4).

¹⁰⁷ See XM 2001 STA at 16784, ¶ 10.

¹⁰⁸ It is worth noting that nothing in the original language prevents Sirius XM from offering different "packages" based on consumer preference, such as the "a la carte" and "special interest" packages currently offered by the company and incorporated into the Commission's Sirius XM merger decision. See, e.g., "Sirius Satellite Radio – Packets & Services," <http://www.sirius.com/packages>. See also *Applications for Consent to the Transfer of Control of Licenses, XM Satellite Radio Holdings Inc., Transferor to Sirius Satellite Radio Inc., Transferee*, Memorandum Opinion and Order, 23 FCC Rcd 12348, 12388 ¶ 88 (2008) (concluding that Sirius

The proposed clause may also cause confusion because the new language may be susceptible to an interpretation that would restrict non-programming related activities unrelated to the competitive concerns of local broadcasters. For example, Sirius XM's terrestrial repeaters currently originate and transmit diagnostic data used to monitor and manage Sirius XM's network that is not intended for reception by subscriber equipment. This data, by its nature, is not "programming," even though it may be local or regional in its origination. The proposed language could inadvertently jeopardize Sirius XM's ability to ensure the efficient operation of its network, while in no way accomplishing the Commission's stated intent with respect to restricting the local origination of programming. Absent evidence that the existing language has been ineffective, or some clear reason for its modification, there is no justification to expand the long-standing prohibition on local programming.¹⁰⁹

V. LEGAL INFIRMITIES PREVENT THE COMMISSION FROM ADOPTING THE PROPOSED RULES.

The proposed rules are legally infirm and should be rejected. It is unlikely the proposed rules could survive "arbitrary and capricious" review under the APA because of their unexplained departure from rules adopted in 1997 to prevent interference to satellite radio and the lack of record evidence to support them. Furthermore, adopting these proposals would also violate Section 316 of the Communications Act because they improperly modify Sirius XM's licenses without the individual hearing procedures provided by the Act. Other significant legal infirmities also stand in the way of adopting the proposed rules.

XM's commitment to provide a la carte programming options "represents a clear public interest benefit").

¹⁰⁹ In the Sirius XM merger proceeding, the company reiterated its commitment to the local programming restrictions in its current repeater STAs. *See* Letter from Robert L. Pettit, Counsel to Sirius Satellite Radio Inc. to Marlene H. Dortch, Secretary, Federal Communications Commission at 3, WT Docket No. 07-57 (filed July 25, 2007).

A. Adopting the Proposed Rules Would Be Arbitrary and Capricious.

Under the APA,¹¹⁰ a reviewing court must set aside agency action that is “arbitrary, capricious, an abuse of discretion, or otherwise not in accordance with law.”¹¹¹ “To survive review under this standard, the FCC must examine and consider the relevant data and factors, ‘and articulate a satisfactory explanation for its action including a rational connection between the facts found and the choice made.’”¹¹² As described below, adopting the proposed rules would run afoul of the APA on at least five separate grounds.

1. The Proposed Rules Are Based on an Improper Evaluation of WCS Licensees’ Business Plans Rather Than Interference.

The management of spectrum resources in order to avoid interference was — and remains today — the foundational mission of the FCC.¹¹³ Indeed, interference prevention is a *specific requirement* of the Communications Act, which provides that the Commission “*shall . . . [m]ake such regulations not inconsistent with law as it may deem necessary to prevent interference between stations.*”¹¹⁴ Other provisions of the Communications Act require the Commission to prevent interference among competing uses. Prior to authorizing “flexible use,”

¹¹⁰ See 5 U.S.C. § 706(2)(A).

¹¹¹ *Id.*

¹¹² *Verizon Telephone Cos. v. FCC*, 570 F.3d 294, 301 (D.C. Cir. 2009) (quoting *Motor Vehicle Mfrs. Ass’n, Inc. v. State Farm Mut. Auto. Ins. Co.*, 463 U.S. 29, 43 (1983)).

¹¹³ In the 1920s, federal courts determined that the Radio Act of 1912 did not allow federal regulators to deny a license because of interference considerations, *see Hoover v. Intercity Radio Co.*, 286 F. 1003 (D.C. Cir. 1923), or to impose restrictions on the frequency, power, or hours of operation of broadcast stations, *see United States v. Zenith Radio Corp.*, 12 F.2d 614 (N.D. Ill. 1926). As the Supreme Court described the situation in *NBC v. United States*, “[t]he result was confusion and chaos. With everybody on the air, nobody could be heard.” 319 U.S. 190, 212 (1932). In direct response, Congress created the Federal Radio Commission, the predecessor to the FCC.

¹¹⁴ 47 U.S.C. § 303(f) (emphasis added).

for example, the Commission must find that such use “would not result in harmful interference.”¹¹⁵ The FCC exists to prevent and police interference among its licensees. The proposed rules ignore this fundamental obligation of avoiding interference.

2. The Proposed Rules Represent a Dramatic Departure from Longstanding and Successful Commission Policy, Which the Agency Said Was “Required” to Prevent Interference.

The APA prohibits the FCC from departing from precedent without acknowledging that it is changing course and supplying a reasoned explanation for doing so.¹¹⁶ “Sharp changes of agency course constitute ‘danger signals’ to which a reviewing court must be alert.”¹¹⁷

The changes proposed by the Commission staff could hardly be more dramatic. In 1997, the very out-of-band emission (“OOBE”) restrictions that the FCC staff now seeks to eliminate were described by the agency as “required” and “necessary to protect prospective satellite [radio] licensees from interference from WCS operations”¹¹⁸ and to “ensure the viability” of satellite radio.¹¹⁹

These OOBE limitations were essential, the Commission said thirteen years ago, because “WCS spectrum is located on both sides of the spectrum allocated” for satellite radio and such limits are “necessary to protect prospective satellite [radio] licensees from interference from

¹¹⁵ *Id.* § 303(y)(2)(C).

¹¹⁶ *Id.*, 570 F.3d at 304 (“[I]t is arbitrary and capricious for the FCC to apply such new approaches without providing a satisfactory explanation when it has not followed such approaches in the past.”).

¹¹⁷ *Natural Resources Defense Council v. EPA*, 683 F.2d 752, 760 (3d Cir. 1982) (quoting *State Farm Mutual Auto. Ins. Co. v. DOT*, 680 F.2d 206, 220 (D.C. Cir. 1982)).

¹¹⁸ *WCS Order*, 12 FCC Rcd at 10787 ¶ 3 (1997).

¹¹⁹ *WCS MO&O*, 12 FCC Rcd at 3991 ¶ 25.

WCS operations.”¹²⁰ In fact, to “ensure that WCS operations do not cause harmful interference or disruption to adjacent satellite [radio] reception,”¹²¹ the Commission specifically rejected more relaxed OOB limits proposed by WCS interests and agreed “with those commenting parties that suggest that additional attenuation of WCS out-of-band emissions is needed to protect such operations.”¹²²

The proposed rules reverse course 180 degrees. Mobile operations that were prohibited in WCS spectrum in 1997 would now be allowed under the proposed rules. OOB emissions permitted within the satellite radio band would be increased by 55 dB or by a factor of more than 300,000 times as compared to the protection levels the Commission established in 1997 and to the levels the Canadian regulatory authority established in 2004 for similar 2.3 GHz band planning in Canada.

No technical explanation could justify this complete about-face. The increased WCS out-of-band emissions fall directly within satellite radio’s licensed band. The laws of physics have not changed, no technological breakthrough would support such a change, and no magic filter will prevent the interference that the Commission believed in 1997 was inevitable. As Sirius XM has shown repeatedly, the risk of harmful interference remains no less of a concern today.

¹²⁰ *WCS Order* ¶ 3.

¹²¹ *Id.* ¶ 136.

¹²² *Id.*

3. No Record Evidence Justifies the Proposed Rules.

Critical to any review of agency action is “the question whether the record as a whole provides substantial evidence to support the agency action.”¹²³ “[T]he court must be able to conclude that the agency examined the relevant data and articulated a satisfactory explanation for its action including a rational connection between the facts found and the choice made.”¹²⁴ “Normally, an agency rule would be arbitrary and capricious if the agency has . . . offered an explanation for its decision that runs counter to the evidence before the agency.”¹²⁵

WCS interests have yet to provide the Commission with any extensive, verifiable and replicable test data to demonstrate that mobile WCS operations will not cause harmful interference to satellite radio. In particular, the record shows no evidence of any engineering analysis or testing regarding the combination of power level, duty cycle, and activity cycle allowed under the proposed rules. Nor does the record contain any data or analysis regarding the interference potential represented by enabling broadband transmissions exceeding 5 MHz, encompassing transmissions in multiple WCS blocks from the same user terminal. Moreover, the proposed fixed CPE rules are not supported by *anything* in the record because the proposed reduction in OOB limits for such devices was never requested, never discussed, and never tested.

By contrast, the record in this proceeding is replete with data and testing that WCS devices operating at the levels contained in the proposed rules will cause harmful interference to

¹²³ *Morall v. DEA*, 412 F.3d 165, 178 (D.C. Cir. 2005); *Safe Extensions, Inc. v. FAA*, 509 F.3d 593, 606 (D.C. Cir. 2007) (“In sum, because the agency’s decision . . . finds no support in the evidence the agency considered, we find it arbitrary and capricious.”).

¹²⁴ *El Rio Santa Cruz Neighborhood Health Ctr., Inc. v. HHS*, 396 F.3d 1265, 1276 (D.C. Cir. 2005) (internal quotation marks and alterations omitted).

¹²⁵ *See, e.g., State Farm*, 463 U.S. at 43.

satellite radios.¹²⁶ Sirius XM has submitted voluminous testing data confirming the scope and nature of potential interference to satellite radio reception from WCS devices.¹²⁷ There is simply no “rational connection between the facts found and the choice made”¹²⁸ in the proposed rules.

4. The Proposed Rules Arbitrarily Treat Similarly Affected Services Differently.

The proposed rules violate the APA because they treat satellite radio licensees differently from similarly impacted entities for no defensible reason. “Where an agency applies different standards to similarly situated entities and fails to support this disparate treatment with a reasoned explanation and substantial evidence in the record, its action is arbitrary and capricious and cannot be upheld.”¹²⁹ The FCC is prohibited from creating an asymmetrical regulatory regime by drawing arbitrary distinctions between similarly situated services.

Despite the same threat of interference from WCS operations, the proposed rules provide far greater protection to MAT licensees than to satellite radio licensees. In fact, the proposed rules impose “coordination requirements” on WCS licensees by requiring them to “coordinate the deployment of base stations” with MAT facilities and “take all practicable steps necessary to reduce the likelihood of harmful interference to MAT facilities.”¹³⁰ In particular, “prior to

¹²⁶ See, e.g., Sirius Comments at 18-25.

¹²⁷ Sirius Ashburn Ex Parte.

¹²⁸ *El Rio Santa Cruz Neighborhood Health Ctr., Inc.*, 396 F.3d at 1276 (internal quotation marks and alterations omitted).

¹²⁹ *Burlington N. & Santa Fe Ry. Co. v. Surface Transp. Bd.*, 403 F.3d 771, 777 (D.C. Cir. 2005); see also *Willis Shaw Frozen Express Inc. v. ICC*, 587 F.2d 1333, 1336 (D.C. Cir. 1978) (stating that there must “be a rational basis discernible from the Commission’s report for disparate treatment of similarly situated parties seeking the same authority” and “[t]hat basis perforce would entail a Commission determination supported by substantial evidence and set forth somewhere in its report that the two applicants in fact were not otherwise similarly situated” (quotation omitted)).

¹³⁰ Proposed Rule § 27.73.

operating such base stations,” WCS licensees must reach a “mutually satisfactory coordination agreement with” MAT entities near the intended WCS base station.¹³¹

The situation with respect to satellite radio is much different. Instead of “coordination requirements,” the proposed rules impose only vague “[i]nformation sharing requirements.”¹³² Rather than requiring a coordination agreement prior to installing a WCS base station, WCS licensees need provide Sirius XM only with advance notice.¹³³ To be sure, WCS licensees “must select base station sites and frequencies, to the extent practicable, to minimize the possibility of harmful interference” to satellite licensees,¹³⁴ but the real-world impact of this requirement could be minimal, and the absence of a similar coordination requirement similar to that required for MAT licensees provides far less protection to satellite radio.

The absence of a parallel coordination requirement means that the duty for WCS licensees to “cooperate in good faith” with satellite radio licensees and MAT licensees will be dramatically different in practice. In view of the coordination requirement, both WCS licensees and MAT receiver operators must “cooperate in good faith in the coordination and deployment of WCS and MAT facilities” *before the facility is even deployed*.¹³⁵ By contrast, WCS licensees’ duty to “cooperate in good faith” is triggered only *after the base station is already deployed and interference has occurred*.¹³⁶ There is no rational explanation for this disparate treatment.

¹³¹ *Id.* § 27.73(a).

¹³² *Id.* § 27.72.

¹³³ *Id.* § 27.72(b).

¹³⁴ *Id.* § 27.72(a).

¹³⁵ *Id.* § 27.73(b).

¹³⁶ *Id.* § 27.72(e).

5. The Commission Must Consider — and Address — the Less Restrictive Alternatives Proposed by Sirius XM.

As detailed above, Sirius XM has proposed several alternatives to allow WCS licensees to make better use of their spectrum while, at the same time, protecting satellite radio consumers from harmful interference. “It is well settled that an agency has a duty to consider responsible alternatives to its chosen policy and to give a reasoned explanation for its rejection of such alternatives.”¹³⁷ However, the proposed rules fail to consider and address these proposed alternatives.

B. The Proposed Rules, if Adopted, Would Unlawfully Modify Sirius XM’s Licenses.

The Supreme Court has long held that any Commission action allowing additional interference to a licensee constitutes a modification of license under Section 316.¹³⁸ Federal courts have repeatedly reaffirmed this holding.¹³⁹ In doing so, courts have emphasized that modifications may occur under Section 316 regardless of whether the actual terms of the affected license are changed,¹⁴⁰ how the agency characterizes its action,¹⁴¹ or who requests the

¹³⁷ *City of Brookings Mun. Telephone Co. v. FCC*, 822 F.2d 1153, 1169 (D.C. Cir. 1987) (quoting *Farmers Union Central Exchange, Inc. v. FERC*, 734 F.2d at 1511 (1984)); *Cincinnati Bell Tel. Co. v. FCC*, 69 F.3d 752, 761 (6th Cir. 1995) (“The FCC is required to give an explanation when it declines to adopt less restrictive measures in promulgating its rules.”).

¹³⁸ *See FCC v. Nat’l Broad. Co.*, 319 U.S. 239 (1943) (holding that a licensee could intervene in a proceeding on whether to grant another application that would change the relevant service rules and lead to interference with the licensee’s use of its assigned spectrum).

¹³⁹ *See, e.g., AMSC Subsidiary Corp. v. FCC*, 216 F.3d 1154, 1158-59 (D.C. Cir. 2000); *Western Broad. Co. v. FCC*, 674 F.2d 44, 49-55 (D.C. Cir. 1982) (“It has long been established that [§ 316] covers indirect . . . modifications, [which] include factual circumstances where it is alleged that a new grant may create objectionable electrical interference to an existing licensee and the existing licensee is protected by Commission policy or regulation from such interference.”); *WBEN, Inc. v. United States*, 396 F.2d 601, 617-20 (2d Cir. 1968).

¹⁴⁰ *See AMSC Subsidiary Corp.*, 216 F.3d at 1158-59 (“Although the Commission did not, of course, literally change the terms of AMSC’s license, we regard ‘a license [as] modified for

alteration.¹⁴² Courts have consistently held that “a license is ‘modified’ within the meaning of [Section 316] whenever the Commission permits additional interference on the licensee’s channel.”¹⁴³ Therefore, as the D.C. Circuit has held, a “claim, alleging that [an action by the FCC] may create objectionable interference, raises a legally cognizable issue under Section 316.”¹⁴⁴

Here, the proposed rules reverse the Commission’s 1997 OOB protections and would cause significant interference to Sirius XM’s satellite radio operations, as has been demonstrated by record evidence in this proceeding, and as has been acknowledged by WCS interests.¹⁴⁵ Adopting the proposed rules unquestionably would constitute a modification of Sirius XM’s licenses within the meaning of Section 316.

Section 316 affords licensees important procedural protections — including an adjudicatory procedure that must be followed whenever the FCC seeks to modify a license.¹⁴⁶

purposes of Section 316 when an unconditional right conferred by the license is substantially affected.” (quoting *P&R Temmer v. FCC*, 743 F.2d 918, 927-28 (D.C. Cir. 1984)).

¹⁴¹ *P&R Temmer*, 743 F.2d at 927 (“[A] court considering the applicability of Section 316 must look beyond the form of the license document and beyond the language employed by the FCC to describe its action.”).

¹⁴² *Community Television, Inc. v. FCC*, 216 F.3d 1133, 1140 (D.C. Cir. 2000) (“The Commission has power under Section 316(a) . . . to modify a license without an application for the modification having been made by the licensee” (citing *Peoples Broad. Co. v. United States*, 209 F.2d 286, 287 (D.C. Cir. 1953))).

¹⁴³ *WBEN, Inc.*, 396 F.2d at 619.

¹⁴⁴ *Western Broad. Co.*, 674 F.2d at 50.

¹⁴⁵ See WCS Coalition Comments at 15 & Attachment B at 6 (providing a probability assessment of interference to satellite radio, which asserts that “the OOB from a WCS device operating with a 55+10 log (P) emissions mask in the [satellite radio] band will have less than a 1 dB impact on the [satellite radio] receiver noise floor”).

¹⁴⁶ 47 U.S.C. § 316(a).

The Commission cannot circumvent Sirius XM’s procedural protections through this rulemaking proceeding.¹⁴⁷ Indeed, courts have readily overturned the agency’s attempts to effect modifications without following the prescribed adjudicatory procedures.¹⁴⁸

Although the Commission may engage in rulemaking to promulgate rules of general applicability that affect a class of licensees,¹⁴⁹ courts have made clear that when an individual licensee’s interests are at stake, only a Section 316 adjudication will suffice. For example, in *California Citizens Band Association v. United States*, the Ninth Circuit held that Section 316’s “primary function is to protect the individual licensee from a modification order of the Commission and is concerned with the conduct and other facts peculiar to an individual licensee.”¹⁵⁰ Thus, the rulemaking proceeding in that case did not violate Section 316’s requirements because it involved “the promulgation of standards of general applicability” to an entire class of licensees.¹⁵¹ The Second Circuit has explained further that although rulemaking may be appropriate where “a new policy is based upon the general characteristics of an

¹⁴⁷ *Committee for Effective Cellular Rules v. FCC*, 53 F.3d 1309, 1319 (D.C. Cir. 1995).

¹⁴⁸ *See, e.g., Western Broad. Co.*, 674 F.2d at 49-55; *FCC v. Nat’l Broad. Co.*, 319 U.S. at 240-46.

¹⁴⁹ *See, e.g., California Citizens Band Ass’n v. United States*, 375 F.2d 43, 50-52 (9th Cir. 1967); *United States v. Storer Broad. Co.*, 351 U.S. 192, 202-04 (1956).

¹⁵⁰ *California Citizens Band Ass’n*, 375 F.2d at 52.

¹⁵¹ *Id.* at 50-52; *see also Washington Utils. & Transport. Comm’n v. FCC*, 513 F.2d 1142, 1160 (9th Cir. 1975) (holding that the Commission properly used a rulemaking proceeding instead of a procedure under Section 316 where the issue met the following standards: “It affected large numbers of individual situations, it involved determination of a general policy applicable equally to all in the affected class, case-by-case adjudication would require repetitious determination of precisely the same issue, it concerned future events, and it required a broad judgment, legislative in nature, rather than resolution of a particular dispute of fact.”)

industry,” adjudicatory proceedings “serve an important function when the agency bases its decision on the peculiar situation of individual parties who know more than anyone else.”¹⁵²

Section 316 was designed to apply to cases just like this. The proposed rules do not directly apply to a broad class of licensees — the interference that will inevitably result from these proposed rules will affect one licensee: Sirius XM. Moreover, given the complexity of the technical interference issues involved, a full adjudicatory hearing would give the Commission the best opportunity to come to a reasoned decision. In other words, “this case highlights rather well the reasons why a hearing should [be] held: the contesting parties have relied on factual assertions that are flatly contradictory; there are difficult and confusing technical issues to be resolved; [and] there is a serious dispute over the proper methodology to be used in measuring interference.”¹⁵³

C. Adopting the Proposed Rules May Violate Sirius XM’s Statutory, Constitutional, and Contractual Rights.

If the proposed rules are adopted, the resulting interference caused by WCS operations effectively could limit Sirius XM’s utilization of its licensed spectrum in violation of its statutory, constitutional, and existing contract rights.

1. The Proposed Rules May Effectuate an Impermissible Retroactive Change to Satellite Radio Licenses.

The proposed rules — in particular the change in OOB limits and the introduction of mobile WCS service — would effect an impermissible retroactive change to Sirius XM’s existing satellite radio licenses acquired at auction. The Commission simply “cannot, in fairness,

¹⁵² *WBEN, Inc.*, 396 F.2d at 618.

¹⁵³ *Western Broad. Co.*, 674 F.2d at 52.

radically change the terms of an auction after the fact.”¹⁵⁴ But this is precisely what the Commission proposes to do here.

The APA limits “rules” to agency prescriptions of “future effect”¹⁵⁵ and prohibits retroactive rules.¹⁵⁶ An agency rule may be unlawfully retroactive in two respects: it may be “primarily retroactive” or “secondarily retroactive.”¹⁵⁷ A rule is primarily retroactive if it “‘impair[s] rights a party possessed when he acted, increase[s] a party’s liability for past conduct, or impose[s] new duties with respect to transactions already completed.’”¹⁵⁸ Such rules are unlawful *per se*.¹⁵⁹ Secondary retroactivity “occurs if an agency’s rule affects a regulated entity’s investment made in reliance on the regulatory status quo before the rule’s promulgation.”¹⁶⁰ “Retroactivity of this sort makes worthless substantial past investment incurred in reliance upon the prior rule.”¹⁶¹

¹⁵⁴ *U.S. AirWaves, Inc. v. FCC*, 232 F.3d 227, 235 (D.C. Cir. 2000).

¹⁵⁵ 5 U.S.C. § 551(4).

¹⁵⁶ *See, e.g., DIRECTV v. FCC*, 110 F.3d 816, 825-26 (D.C. Cir. 1997) (holding that “primarily retroactive” rules are *per se* unlawful under the APA); *Chadmoore Commc’ns, Inc. v. FCC*, 113 F.3d 235, 240 (D.C. Cir. 1997) (“[A] legislative rule may only be applied prospectively.”); *see also Bowen v. Georgetown Univ. Hosp.*, 448 U.S. 204, 216 (1988) (Scalia, J., concurring) (stating that the APA “does not permit retroactive application” of agency rules).

¹⁵⁷ *See, e.g., DIRECTV*, 110 F.3d at 825-26; *see also, e.g., Bergerco Canada v. U.S. Treasury Dep’t*, 129 F.3d 189, 192 (D.C. Cir. 1997) (“[T]here are two retroactivity limits in the APA: The first is a categorical limit, requiring express congressional authority and applying only in the domain of agency rules. The second limit is more elastic, governing all agency decisionmaking and involving the sort of balancing of competing values, both legal and economic, that often features in ‘arbitrary or capricious’ analysis and that has historically governed retroactivity considerations in the agency context.”).

¹⁵⁸ *DIRECTV*, 110 F.3d at 825-26 (quoting *Landgraf v. USI Film Prods.*, 511 U.S. 244, 280 (1994)).

¹⁵⁹ *Bergerco*, 129 F.3d at 192.

¹⁶⁰ *Mobile Relay Assocs. v. FCC*, 457 F.3d 1, 11 (D.C. Cir. 2006). “This sort of retroactivity — characteristic of a rule having exclusively ‘future effect’ but affecting the desirability of past

The proposed rules, which reduce WCS OOB limits to levels that will allow harmful interference to satellite radio service, would be primarily retroactive because they significantly impair the rights provided by Sirius XM's licenses. Moreover, the proposed rules may also be secondarily retroactive because bidders for satellite radio licenses relied on the reasonable expectation that they would receive what they bid on — *i.e.*, spectrum suitable for the provision of satellite radio service in the *entirety* of the band. Bidders specifically relied on the Commission's rules protecting satellite radio spectrum from interference from mobile WCS operations. Those bidders then spent billions to build-out their satellite networks and design radios based on the same rules in existence when they purchased their licenses. Thus, the WCS proposal to increase interference to satellite radio would “impair rights [the] party possessed when . . . [it] acted,”¹⁶² and “alter the past legal consequences of past actions.”¹⁶³ This squarely fits within the definition of retroactive rulemaking.

2. Adopting the Proposed Rules May Breach Sirius XM's Existing Contractual Relationship with the FCC for Satellite Radio Licenses.

Adopting the rules as proposed may violate the contractual relationship established when the Commission granted satellite radio licenses to Sirius and XM. Spectrum auctions, no less than other types of auctions, create binding contracts between the Government and the winning

transactions — has become known as ‘secondary retroactivity.’” *Celtronix*, 272 F.3d at 589 (citing *Bowen*, 488 U.S. at 219-20 (Scalia, J., concurring)).

¹⁶¹ *Bergerco*, 129 F.3d at 192-93 (quotation marks omitted).

¹⁶² *DIRECTV*, 110 F.3d at 825 (quoting *Landgraf v. USI Film Prods.*, 511 U.S. 244, 280 (1994)).

¹⁶³ *Mobile Relay*, 457 F.3d at 11 (quoting *Bowen*, 488 U.S. at 219 (Scalia, J., concurring)); accord *Celtronix Telemetry, Inc. v. FCC*, 272 F.3d 585, 586 (D.C. Cir. 2001); *Bergerco*, 129 F.3d at 193; *Chadmoore*, 113 F.3d at 241.

bidder.¹⁶⁴ Indeed, a spectrum auction creates “a binding mutual obligation between the Commission and the winning bidder as of the close of the auction.”¹⁶⁵ “[F]ederal government auctions are ‘viewed under the same rules pertaining to the formation of contracts generally.’”¹⁶⁶ The Commission has further stated that its licenses create “spectrum usage rights” that are “defined within the terms, conditions, and period of the license at the *time of issuance*.”¹⁶⁷ Indeed, Commission policy strongly disfavors interference with existing licenses.¹⁶⁸ Licensees “must have certain rights and responsibilities that define and ensure their economic interests,” among these “the right to be protected from interference to the extent provided in the Commission’s rules.”¹⁶⁹ In the *NextWave* case — where the relevant party is the same corporate

¹⁶⁴ *In re NextWave Personal Commc’ns, Inc.*, 200 F.3d 43, 60 (2d Cir. 1999) (“the close of the auction — traditionally the drop of the hammer — signals acceptance of an offer and forms an enforceable contract”).

¹⁶⁵ *Amendment of the Commission’s Rules Regarding Installment Payment Financing for Personal Communications Services (PCS) Licensees*, Second Order on Reconsideration of the Second Report and Order, 14 FCC Rcd 6571, 6581 n.66 (¶ 17) (1999).

¹⁶⁶ *In the Matter of BDPCS, Inc.*, 15 FCC Rcd 17590, 17599 n.63 (¶ 16) (2000) (quoting *Commodities Recovery Corp. v. United States*, 34 Fed. Cl. 282, 289 (1995)).

¹⁶⁷ *Principles for Promoting the Efficient Use of Spectrum by Encouraging the Development of Secondary Markets*, 15 FCC Rcd 24178, 24187 (¶ 22) (2000) (“*Spectrum Policy Statement*”) (emphasis added).

¹⁶⁸ *See, e.g., In the Matter of Township of Cinnaminson, New Jersey*, Order, 22 FCC Rcd 4583 (2007) (considering possible interference with spectrum users as a factor when denying license application and related waiver request); *In the Matter of City of Richmond, Virginia*, Order, 21 FCC Rcd 14,384 (2006) (same); *Advanced Wireless Spectrum (AWS-1 Auction)*, Small Entity Compliance Guide, 21 FCC Rcd 9098, 9102 (2006) (explaining that the Commission requires that licenses not interfere with incumbent licenses); *Office of Engineering and Technology Seeks Additional Comment on Petitions for Reconsideration for Unlicensed National Information Infrastructure Devices*, Public Notice, 21 FCC Rcd 4339, 4340 (describing Commission’s efforts to minimize interference with existing radiofrequency operations).

¹⁶⁹ *Spectrum Policy Statement*, 15 FCC Rcd at 24186 (¶ 20).

entity as the holder of the largest block of WCS licenses — the Second Circuit accepted the Commission’s argument that a spectrum auction results in an enforceable contract.¹⁷⁰

Revising the WCS rules to allow harmful interference that reduces the value of Sirius XM’s licenses would breach the contract established at the spectrum auction. As noted above, Sirius XM paid millions of dollars for the right to use satellite radio spectrum based on auction terms that promised bidders the spectrum could be used for satellite radio service and free from interference.¹⁷¹ This promise was reinforced by the Commission’s imposition of strict OOB limits for adjacent WCS licensees — specifically in order to protect satellite radio from interference.

3. The Proposed Rules May Result in a Fifth Amendment Taking.

The interference resulting from the proposed rules’ relaxation of OOB limits also likely constitutes a taking in violation of the Fifth Amendment.¹⁷² Government regulation that burdens

¹⁷⁰ *NextWave*, 200 F.3d at 61-62 (noting that “the obligations NextWave seeks to avoid arose no later than the announcement of the winning bid, . . . [t]he FCC was bound, and so was NextWave”). Moreover, courts in *United States v. Winstar*, 518 U.S. 839 (1996), and *Centex Corp. v. United States*, 395 F.3d 1283 (Fed. Cir. 2005), emphasized that the duty of good faith and fair dealing protects against meddling with the reasonable expectations of a party regarding the fruits of a contract, particularly if the other party contributed to those expectations. *See Winstar*, 518 U.S. at 855 (stating that it was “not obvious that regulators would accept purchase accounting in determining compliance with regulatory criteria, and it was clearly prudent to get agreement on the matter”); *Centex*, 395 F.3d at 1288 (noting that the request for bids and the agreement between the S&Ls and the FSLIB indicated that the FSLIB understood and contributed to the S&Ls expectation that they would be able to take advantage of certain tax benefits and that the expectation “was not unilateral”). This includes expectations with respect to both a licensee’s current and future use of the spectrum.

¹⁷¹ *WCS Order*, 12 FCC Rcd at 10787 ¶¶ 3, 25; *see also WCS MO&O*, 12 FCC Rcd at 3978 ¶ 3, 3992 ¶ 25.

¹⁷² The FCC’s proposal to modify the OOB limits may also constitute a “per se” taking in violation of the Fifth Amendment. A “per se” taking results in a “permanent physical occupation” or denies the owner of all economically beneficial use of property. *Loretto v. Teleprompter Manhattan CATV Corp.*, 458 U.S. 419, 426 (1982). The interference resulting from WCS wireless mobile service could become so severe as to constitute a “per se” taking if the interference renders adjacent satellite radio spectrum useless.

property in a manner that, among other things, unfairly interferes with the owner's "investment-backed expectations" constitutes a regulatory taking.¹⁷³ The Supreme Court's regulatory takings inquiry focuses on the character of the government action, the economic impact of the government action, and reasonable investment-backed expectations.¹⁷⁴

Relaxing the OOBE limits will cause additional harmful interference to satellite radio services operating in adjacent spectrum. The economic impact of this interference could be substantial. Sirius XM has invested billions of dollars to establish a nationwide radio network with the expectation that its satellite radio licenses would be free from harmful interference from WCS.¹⁷⁵ If the Commission adopts the proposed rules, the resulting interference could disrupt Sirius XM's reasonable, investment-backed expectations in the provision of satellite radio.

D. The Proposed Rules Allowing Mobile Services in the WCS Band Would Require a Reauction of That Spectrum.

The proposed rule changes would bestow fundamentally greater rights on WCS operators than they now hold, triggering the need to reauction the WCS spectrum. As noted above, when the Commission allocated WCS spectrum, it imposed strict OOBE limits on WCS operations.¹⁷⁶ The Commission made clear that it expected these limits would "make mobile operations in the WCS spectrum technologically infeasible."¹⁷⁷ As a result, the auction of that spectrum yielded

¹⁷³ See *Penn Cent. Transp. Co. v. City of New York*, 438 U.S. 104, 124 (1978).

¹⁷⁴ *Id.*

¹⁷⁵ *Applications for Consent to the Transfer of Control of Licenses XM Satellite Radio Holdings Inc., Transferor, to Sirius Satellite Radio Inc., Transferee*, 23 FCC Rcd 12348 (¶ 50 n.162) (2008).

¹⁷⁶ See *WCS Report and Order*, 12 FCC Rcd at 10787, 10848-57 (¶¶ 3, 123-144) (requiring that all out-of-band emissions from WCS mobile transmitters be attenuated below p by at least 110+10 log (p) dBW within the [satellite radio] band).

¹⁷⁷ *Id.* at 10787 (¶ 3); *WCS MO&O*, 12 FCC Rcd at 3978 (¶ 3).

less than \$14 million for the U.S. Treasury — with some of the licenses selling for only \$1 each.¹⁷⁸

By allowing WCS operators to deploy mobile devices, at the expense of creating interference to satellite radio services, the Commission will transform the original WCS licenses into something vastly more valuable.¹⁷⁹ The FCC, thus, would deny the U.S. taxpayer the fair proceeds reflecting the true value of the spectrum under the modified rules.¹⁸⁰ Moreover, it would reward WCS licensees for petitioning for a change in rules and then declining to construct their facilities based on “regulatory uncertainty.”¹⁸¹ This not only is inequitable in the circumstances, but also would set a dangerous precedent: It essentially sends the message that if licensees simply decline to build out their authorizations and serve the public, choosing instead to seek looser rules that will make their investment more profitable, the government will richly reward them. Moreover, the limited construction that has gone on in the WCS band means that few customers will be inconvenienced by reauctioning the spectrum. If the Commission,

¹⁷⁸ See, e.g., Press Release, *WCS Auction Closes, Winning Bidders in the Auction of 128 Wireless Communications Service Licenses*, Public Notice, 12 FCC Rcd 21653 (1997) (noting that Auction 14, the WCS auction, “rais[ed] a net total of \$13,638,940 for the U.S. Treasury”).

¹⁷⁹ For instance, if a rule change permits WCS mobile operations, the impending sale of WCS spectrum by NextWave would produce far greater proceeds than it would under the current rules.

¹⁸⁰ See *Implementation of Section 309(j) of the Communications Act — Competitive Bidding*, Second Report and Order, 9 FCC Rcd 2348, 2349, 2355 (¶¶ 1, 37-40) (1994) (stating that “competitive bidding will promote the objectives described in Section 309(j)(3) [of the Communications Act], . . . [including] recovery for the public of a portion of the value of the public spectrum made available for commercial use and avoidance of unjust enrichment”). To highlight the greater value of mobile spectrum, in the 2006 AWS-1 auction, licenses for 90 MHz of spectrum raised approximately 13.7 billion in net bids thus establishing a \$0.51 MHz/POP value for that spectrum. Applying that value to the 30 MHz of WCS spectrum yields a nationwide spectrum value of approximately \$4.6 billion, far greater than the \$14 million paid.

¹⁸¹ See, e.g., Comments of the WCS Coalition, WT Docket 07-293 at i (filed Apr. 21, 2010).

therefore, decides to accommodate mobile services in the band, the spectrum should be reauctioned to “better serve the public interest.”¹⁸²

VI. CONCLUSION.

For the foregoing reasons, Sirius XM respectfully requests that the Commission modify its proposed rules to protect its existing satellite radio service from harmful interference.

Respectfully submitted,

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¹⁸² *Airfone Report and Order*, 20 FCC Rcd at 4438 (¶ 74).

EXHIBIT A:

TECHNICAL APPENDIX

I. Introduction

Sirius XM has recently conducted a series of laboratory and field tests to establish the signal levels that would block the reception of the satellite radio due to transmissions from mobile and fixed devices deployed in the various WCS blocks.¹⁸³ These tests were conducted in Lawrenceville, NJ during April 2010. The following chart illustrates the satellite radio (SDARS) and WCS spectrum plans for reference in the following discussion.

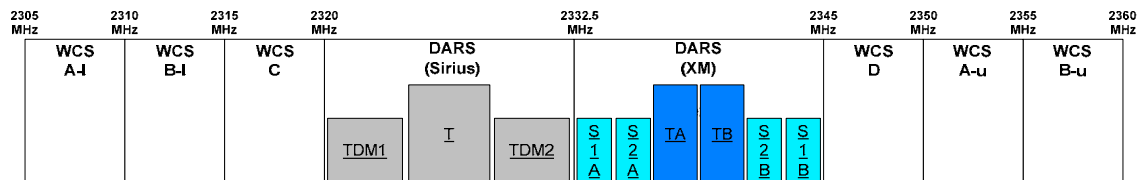


Figure 1 WCS and Satellite Radio Services Spectrum at 2.3 GHz

The following assumptions were used during these tests:

- The WCS deployment is presumed to be based on the 802.16e WiMAX standard.
- The tests used standard “off the shelf” test equipment along with 802.16e WiMAX signals that would meet the proposed rules for Out Of Band Emissions and transmit power.
- Satellite radio reception was tested using the lower WCS frequency blocks (A-lower, B-lower, and C) as the interfering sources.
- The tests were conducted with standard WCS uplink transmit profiles represented by utilizing different WiMAX transmit duty cycles, frame repetition rates, signal bandwidths, and transmit power levels.
- The tests transmitting in the WCS C block assumed use of a 2.5 MHz guard band, as described in the FCC’s proposed rules.
- In the case of the laboratory tests, the desired satellite radio signal was set to -100 dBm, which is consistent with the satellite signal that is available in many satellite radio customer markets.
- In the case of the field tests, the radio used was allowed to operate in its normal “off the shelf” consumer mode, with full satellite link margins available.

¹⁸³ These tests were conducted pursuant to Special Temporary Authority issued by the Federal Communications Commission (File No. 0591-EX-ST-2007, Call Sign WD9XDT).

Test Set Up and Description

The test effort included a laboratory component and a field component. The field component was composed of both mobile and fixed WCS WiMAX test scenarios.

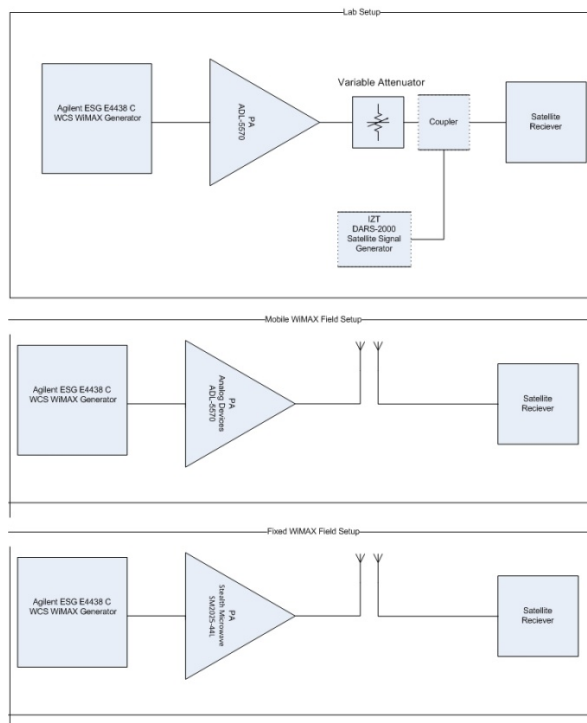


Figure 2: WCS WiMAX Setup

I.a. Laboratory testing

The laboratory tests were designed to determine the levels (in dBm) of the interfering signal that would cause interference to various satellite radio receivers. Satellite radio's interference muting point is defined to be the received WCS power at which the audio stream experiences interruption, i.e. muting. These tests were executed in a conducted environment. The setup consisted of an Agilent WiMAX signal generator (Agilent ESG4433C), amplifier (Analog Devices ADL-5570), a frequency unselective variable attenuator, and required cabling. In this setup, the signal generator output fed the power amplifier, whose output was then fed to the variable attenuator, and then coupled into the satellite radio receiver with both useful satellite signals. Each satellite was set to -100 dBm per 4 MHz at the input to the satellite radio receiver.

I.b. Field Test Setup

The field tests were designed to determine the distances at which a WCS emitter stops causing interference to satellite radio receivers.

I.b.1 Mobile WCS/WiMAX Field Test Setup

The mobile field test WCS transmitter setup consisted of an Agilent WiMAX signal generator (Agilent ESG4433C), amplifier (Analog Devices ADL-5570), and WCS transmitter antenna and required cabling. The ADL-5570 amplifier was chosen to provide the natural OOB roll-off similar to a cellular emitter. The interfering WCS transmitter antenna was placed inside of a car, and was held on the passenger seat at the same height as the passenger head rest. The interfering satellite radio vehicle had a satellite radio antenna that was installed based on the guidelines Sirius XM provides to its radio manufacturers. During the test, either one or both vehicles were in motion simulating different separation distances to measure interference effects and the resulting distances that would cause full muting of the satellite radio receiver.

I.b.2 Fixed WCS/WiMAX Field Test Setup

The fixed field test WCS transmitter setup consisted of an Agilent WiMAX signal generator (Agilent ESG4433C), amplifier (Stealth Microwave SM2025-44L), and WCS transmitter antenna and required cabling. The SM2025-44L amplifier was chosen because it is able to generate enough power to take advantage of the 2 W transmitted power allowance, and is linear enough to meet the OOB requirement of $55 + 10 \cdot \log(P)$. The antenna was mounted on a piece of PVC pipe at 10 ft above the ground, and stationed to simulate a fixed WCS transmitter antenna situated on a pole or the side of a residential or commercial building. The test setup is shown in the below pictures.



Figure 3: WCS Fixed User Terminal Interference Test Setup

In both field setups, the signal generator output fed the power amplifier, whose output is then fed to the antenna. The radiated interference signal levels were then adjusted to achieve the tested WCS interferer transmit power level. At the tested transmit power level the proposed OOB mask of $55+10*\log(P)$ was met or exceeded (with weaker out of band emissions from the power amplifier). The antenna was a dipole with an overall antenna gain of 0 dBi toward the horizon.

II. Test Results

II.a. Laboratory Results:

Table 1 shows the maximum WCS interference levels, in dBm/5MHz, that still allow uninterrupted audio performance. Increasing the WCS interferer beyond these levels caused the onset of muting in the audio stream.

Table 1 - Laboratory Test Results

For all laboratory tests, the satellite radio receiver could receive signals from both satellites, and satellite levels were fixed at -100 dBm within a 4 MHz satellite radio channel.

Test Case ID	WiMAX Uplink Transmit Duty Cycle	WiMAX Frame Activity Repetition Rate	WCS block Where The WiMAX Signal Is Transmitted	WiMAX Signal Bandwidth	WCS Transmitter Description WCS Tx Power , OOB	Measured Interference Level Where Satellite Radio Mutes
(#)	(%)	(Frame Repetition Rate)	(MHz)	(MHz)	Tx (mW), OOB (dBW/MHz, measured OOB level Within the 1 st 1 MHz of the SDARS Band), Resulting OOB Mask That Can Be Met	(dBm)
1	12.50%	Every frame	C – block (with 2.5 MHz guard band)	2.5 MHz	125 mW, -57 dBW/MHz, 57+10*log(P)	-56
2	12.50%	Every other frame	C – block (with 2.5 MHz guard band)	2.5 MHz	125 mW, -57 dBW/MHz, 57+10*log(P)	-33
3	12.50%	Every frame	B-lower block	5 MHz	250 mW, -55 dBW/MHz, 55+10*log(P)	-50
4	12.50%	Every frame	B-lower block	5 MHz	125 mW, -66 dBW/MHz, 66+10*log(P)	-45
5	31.00%	Every frame	B-lower block	5 MHz	250 mW, -55 dBW/MHz, 55+10*log(P)	-55
6	31.00%	Every frame	A-lower block	5 MHz	250 mW, -61 dBW/MHz, 61+10*log(P)	-49
7	12.50%	Every frame	A-lower block	5 MHz	250 mW, -61 dBW/MHz, 61+10*log(P)	-46
8	31.00%	Every frame	A-lower and B-lower	10 MHz	250 mW, -55 dBW/MHz, 55+10*log(P)	-58
9	31.00%	Every other frame	A-lower and B-lower	10 MHz	250 mW, -55 dBW/MHz, 55+10*log(P)	-54

II.b. Mobile WCS/WiMAX Field Test Results:

Table 2 below shows the minimum distance at which a satellite radio stream will begin to play uninterrupted audio in the presence of a Mobile WiMAX WCS transmitter, under clear line of site conditions for the satellite radio receiver, which allows it to use its full link margin to mitigate interference. This is a best case scenario for interference protection. In mobile cases, mobile multipath and fading will reduce the link margin, and as a result the interference impact will amplify more significantly.

For all field tests, the satellite radio receiver could receive signal from both satellites, and satellite signal levels were full power on the ground, allowing testing of the interference impact to full link margin. Therefore, it should be noted that the impact of the interference will be more severe in mobile fading conditions where the satellite radio signal has less link margin.

Table 2 - Mobile WCS/WiMAX Field Tests Measuring the Interference Muting Distance

Test Case ID	WiMAX Uplink Tx Duty Cycle	WiMAX Frame Activity Repetition Rate	WCS block Where The WiMAX Signal Is Transmitted	WiMAX Signal Bandwidth	WCS Transmitter Description WCS Tx Power , OOB	Measured Interference Distance Where Satellite Radio is Muted
(#)	(%)	(Frame Repetition Rate)	(MHz)	(MHz)	Tx (mW), OOB (dBW/MHz, measured OOB level Within the 1 st 1 MHz of the SDARS Band), Resulting OOB Mask That Can Be Met	(Meters)
10	31.00%	Every frame	B-lower block	5 MHz	125 mW, -57 dBW/MHz, 57+10*log(P)	18
11	31.00%	Every other frame	B-lower block	5 MHz	250 mW, -61 dBW/MHz, 61+10*log(P)	10
12	31.00%	Every frame	A-lower block	5 MHz	250 mW, -61 dBW/MHz, 61+10*log(P)	11
13	31.00%	Every frame	A-lower and B-lower	10 MHz	250 mW, -55 dBW/MHz, 55+10*log(P)	22
14	31.00%	Every other frame	A-lower and B-lower	10 MHz	250 mW, -55 dBW/MHz, 55+10*log(P)	12

II.c. Fixed WCS/WiMAX Field Test Results

Table 3 below shows the minimum distance at which a satellite radio stream will begin to play uninterrupted audio in the presence of a Fixed WCS WiMAX transmitter, under clear line of site conditions with full satellite radio link margin. It must be noted that the impact will be more severe in mobile fading conditions where the satellite radio signal has less link margin.

For all field tests, the satellite radio receiver could receive signal from both satellites and satellite signal levels were full power on the ground.

Table 3 - Fixed WCS/WiMAX Field Tests Measuring the Interference Muting Distance

Test Case ID	WiMAX Uplink Tx Duty Cycle	WiMAX Frame Activity Repetition Rate	WCS block Where The WiMAX Signal Is Transmitted	WiMAX Signal Bandwidth	WCS Transmitter Description WCS Tx Power , OOB	Measured Interference Distance Where Satellite Radio Is Muted
(#)	(%)	(Frame Repetition Rate)	(MHz)	(MHz)	Tx (W), OOB (dBW/MHz, measured OOB level Within the 1 st 1 MHz of the SDARS Band), Resulting OOB Mask That Can Be Met	(Meters)
15	31.00%	Every frame	B-lower block	5 MHz	2W, -57 dBW/MHz, 57+10*log(P)	51
16	31.00%	Every frame	A-lower and B-lower	10 MHz	2W, -55 dBW/MHz, 55+10*log(P)	113
17	31.00%	Every other frame	A-lower and B-lower	10 MHz	2W, -55 dBW/MHz, 55+10*log(P)	49

III. Discussion of Results

These test results showed the following:

- **Interference to satellite radio receiver decreases when the duty cycle of the WCS/WiMAX waveform is reduced to optimum level of less than 12.5%.**
 - In the lab test case pair 6+7, the only parameter that changes between the pairs is the duty cycle. The decrease in interference of a WCS/WiMAX signal by limiting the duty cycle is 3 dB.
- **Reduction in frame repetition rate, from transmissions every 5ms frame to transmissions every other frame (activity every 10ms), will significantly decrease the level of interference into a satellite radio receiver from a WCS/WiMAX signal (i.e. there will be no activity in consecutive transmit frames for any mobile).**

- In the lab test case pairs 1+2 and 8+9, the only parameter that changes between the pairs is the frame repetition rate. The improvement in interference of a WCS/WiMAX signal by limiting the frame repetition rate is 23, and 4 dBm respectively.
- In field test case pairs 10+11, 13+14, and 16+17, the only parameter changed between the pairs is the frame repetition rate. The improvement in interference of a WCS/WiMAX signal by limiting the frame repetition rate is a 44, 45, and 56 percent distance reduction, respectively.
- **An increase in a WiMAX signal's bandwidth (from 5 MHz to 10MHz) from potential bonding of the WCS blocks will cause more harmful interference into a satellite radio receiver than a 5 MHz signal itself.**
 - In the lab test case pairs 5+6, the only parameter changed is the center frequency of the waveform and as expected, the satellite radio receiver experiences more interference from a waveform closer to its band edge. Test Case 8 has a 10 MHz waveform that encompasses the same frequencies and has the same duty cycle and transmit power, 250 mW, as test cases 5 and 6, yet the satellite radio receiver shows 3-9 dB less tolerance than the equivalent 5 MHz waveforms in the same bands.
 - In the field test case pairs 10+12, the only parameter changed is the center frequency of the waveform and as expected, the satellite radio receiver tolerates less interference from a waveform closer to its band edge. Test Case-13 has a 10 MHz waveform that is the same duty cycle and transmit power as Test Cases 10 and 12, yet the satellite radio receiver shows 3-11 meters less tolerance than the equivalent 5 MHz waveforms in the same bands.
 - Field test case-16 shows the interference of a 10 MHz waveform, with a 31% duty cycle transmitted at 2 W meeting a $55+10*\log(P)$ OOB mask, into a satellite radio receiver. Test case-15 shows the improvement seen by decreasing the BW to 5 MHz, but keeping the transmit power of 250 mW, duty cycle of 31%, and the frequency gap from the satellite radio band edge remaining the same. The improvement of interference tolerated for a WCS WiMAX signal, into a satellite radio receiver, by limiting the BW is seen to be a 54 percent distance reduction.
- **A reduction in transmit power, from 250 mW to 125 mW (3 dB), will decrease the level of interference into a satellite radio receiver from a WCS WiMAX signal.**
 - In the lab test case pair 3+4, the only parameter changed is the transmit power of the waveform. This 3 dB reduction in transmit power provides a decrease of 5 dB interference into the satellite radio receiver because of the natural reduction of an amplifier's characteristics.
- **Fixed WCS terminals at the proposed levels will create significant interference distances exceeding 50 to 100 meters.**

- Results are shown in as shown in Table 3. Since fixed terminal antennas would be located on poles with visibility to the street, rely less on use of power control and transmit at 2W with the relaxed levels of $55+10\log P$, they are measured to create significant interference distances exceeding 50 to 100 meters. Resulting interference is expected to result in satellite radio reception outage areas larger than a football field for each of these transmitters.

IV. Conclusion

This data shows that major reductions in interference caused by a WCS WiMAX signal into a satellite radio receiver can be achieved by all of the following:

- Limiting the duty cycle, where the optimum levels are less than 12.5%;
- Limiting the frame repetition rate (i.e. no consecutive transmit frames for any mobile in less than a 10ms interval);
- Limiting transmit power; and
- Reducing the maximum allowable transmit signal bandwidth (i.e. no WCS block bonding).

These limitations on the WiMAX network management on the subscriber devices are supported by all WiMAX chipsets and would have little impact on realizable user data rates. All this can be accomplished without requiring a WCS specific, “one off” hardware solution.

EXHIBIT B:

The Proposed WCS Rules are Not “Fair and Balanced”

Exhibit B: The Proposed WCS Rules are Not “Fair and Balanced”

Issue	Sirius XM	WCS Licensees	FCC Staff
Duty Cycle Limit	6%. ¹	Opposed 12.5%, 25% and 35%. ²	38%. ³
OBE Limits (Mobile and Portable)	$70 + 10 \log (P)$. ⁴	$55 + 10 \log (P)$ on the first 4 MHz $61 + 10 \log (P)$ on the next 4 MHz $67 + 10 \log (P)$ in the center 9 MHz. ⁵	$55 + 10 \log (P)$ on the first 4 MHz $61 + 10 \log (P)$ on the next 4 MHz $67 + 10 \log (P)$ in the center 9 MHz. ⁶
OBE Limits (Fixed CPE)	Opposed relaxed limits for fixed CPE operating at 2 watts or less. ⁷	Relaxed limits for fixed CPE with 2 watts average EIRP or less. ⁸	Relaxed limits for fixed CPE with 2 watts average EIRP or less. ⁹
Power Limits (Mobile and Portable)	Opposed 250 milliwatt power limits. ¹⁰	Horizon Wi-Com and NextWave Wireless proposed 150 milliwatt power limits. ¹¹	250 milliwatts average EIRP. ¹²
Guard Band	5 MHz in the C and D blocks. ¹³	Proposed 2 MHz ¹⁴ ; Tested 2.5 MHz. ¹⁵	2.5 MHz. ¹⁶
Transmit Power Control	Clearly defined TPC. ¹⁷	No definition for TPC. ¹⁸	No definition for TPC. ¹⁹
Information Sharing	90 days’ notice ²⁰ and detailed information. ²¹	“Heads up.” ²²	10 days’ notice (5 days’ notice for modifications). ²³

¹ Letter from Terrence R. Smith, Corporate Vice President and Chief Engineering Officer, and James S. Blitz, Vice President, Regulatory Counsel for Sirius XM, to Ronald Repasi, Deputy Chief, Office of Engineering and Technology, Federal Communications Commission at 4-5 (filed Jan. 4, 2010) (“Sirius XM Jan. 4, 2010 Ex Parte”); Letter from Robert L. Pettit, Counsel to Sirius XM Radio, Inc. to Marlene H. Dortch, Secretary, Federal Communications Commission, IB Docket No. 95-91, WT Docket No. 07-293, at Attachment Slide 7 (filed Jan. 22, 2010) (“Sirius XM Jan. 22, 2010 Ex Parte”).

² Letter from Paul J. Sinderbrand, Counsel to the WCS Coalition, to Julius Knapp, Chief, Office of Engineering and Technology, Ruth Milkman, Chief, Wireless Telecommunications Bureau, Mindel De La Torre, Chief, International Bureau, Federal Communications Commission, Docket No. 07-293 at 2-3 (filed Mar. 31, 2010).

³ *Commission Staff Requests that Interested Parties Supplement the Record on Draft Interference Rules for Wireless Communications Service and Satellite Digital Audio Radio Service*, Public Notice, WT Docket No. 07-293, IB Docket No. 95-91, GEN Docket No. 90-357, RM No. 8610 at 9, Proposed Rule § 27.50(a)(3)(i) (rel. Apr. 2, 2010) (“Proposed Rule”).

⁴ Sirius XM Jan. 4, 2010 Ex Parte at 6-7.

⁵ Letter from Paul J. Sinderbrand, Counsel to the WCS Coalition, to Marlene H. Dortch, Secretary, Federal Communications Commission, WT Docket No. 07-293, IB Docket No. 95-91 at 9 (filed Dec. 10, 2009); Letter from Jennifer M. McCarthy, Vice President, Regulatory Affairs, NextWave Wireless Inc., at 2 (filed Nov. 17, 2008) (“NextWave Wireless Nov. 17, 2008 Ex Parte”).

⁶ Proposed Rule § 27.53(a)(3).
⁷ Reply Comments of Sirius Satellite Radio Inc., WT Docket No. 07-293, IB Docket No. 95-91, Gen Docket No. 90-357, RM No. 8610 at 16 (filed Mar. 17, 2008).
⁸ Comments of the WCS Coalition, WT Docket No. 07-293, IB Docket No. 95-91, GEN Docket No. 90-357, RM No. 8610 at 10 (filed Feb. 14, 2008).
⁹ Proposed Rule § 27.53(a)(2)(ii).
¹⁰ Letter from Terrence R. Smith, Corporate Vice President and Chief Engineering Officer, and James S. Blitz, Vice President, Regulatory Counsel for Sirius XM, to Marlene H. Dortch, Secretary, Federal Communications Commission at 5 (filed Aug. 3, 2009).
¹¹ NextWave Wireless Nov. 17, 2008 Ex Parte at 2-3.
¹² Proposed Rule § 27.50(a)(3)(i).
¹³ Sirius XM Jan. 22, 2010 Ex Parte at Attachment Slide 6.
¹⁴ NextWave Wireless Nov. 17, 2008 Ex Parte at 2.
¹⁵ Letter from Paul J. Sinderbrand, Counsel to the WCS Coalition, to Marlene H. Dortch, Secretary, Federal Communications Commission, WT Docket No. 07-293, IB Docket No. 95-91 at 5-6 (filed May 19, 2009).
¹⁶ Proposed Rule § 27.50(a)(3)(ii).
¹⁷ Sirius XM Jan. 22, 2010 Ex Parte at Attachment Slide 8.
¹⁸ Letter from Paul J. Sinderbrand, Counsel to the WCS Coalition, to Marlene H. Dortch, Federal Communications Commission, WT Docket No. 07-293, IB Docket No. 95-91 at 4 (filed Jan. 29, 2010).
¹⁹ Proposed Rule § 27.50(a)(3)(iii).
²⁰ Sirius Satellite Radio Inc., Petition for Rulemaking and Comments at A-1 (filed Oct. 17, 2006).
²¹ Letter from Terrence R. Smith, Corporate Vice President and Chief Engineering Officer, and James S. Blitz, Vice President, Regulatory Counsel, Sirius XM, to Julius P. Knapp, Chief, Office of Engineering and Technology, FCC, WT Docket No. 07-293, IB Docket No. 95-91 at 2, A2-A3 (filed Mar. 17, 2010).
²² Letter from Paul J. Sinderbrand, Counsel to the WCS Coalition, to Marlene H. Dortch, Federal Communications Commission, WT Docket No. 07-293, IB Docket No. 95-91 at 2 (filed Mar. 15, 2010).
²³ Proposed Rule § 27.72.